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PRINCIPLES OF MEDICAL TREATMENT

By

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FIFTH REVISED EDITION

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SERUM TREATMENT OF PNEUMONIA

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TO
WILLIAM HENRY SMITH, M.D.
TEACHER IN MEDICINE
AND
FRIEND TO MANY

PREFACE.

This work represents an attempt to offer clearly and concisely sound principles of treatment based on known pathology. The methods described are selected from those that have been tried at the Massachusetts General Hospital or in private practice. Most of them have been taught by Prof. F. C. Shattuck, Dr. William H. Smith or others on the staff of the Hospital or of the Harvard Medical School. It is not to be supposed that any of these men subscribe fully to every thing here set forth or that further advance will not require revision.

The writer wishes here to express his deep appreciation of the debt which he owes to his teachers in medicine, of their kindness to pupils and of their humanity to patients.

Brevity being essential to the writer's purpose, this synopsis is necessarily incomplete. The book was prepared primarily for use in the Harvard Medical School.

G. C. S.

PREFACE TO SECOND EDITION.

In this edition, as in the first, completeness has been sacrificed to brevity, but new material has been added and many changes have been made.

More reliance than before has been placed on personal experience, but the information about salvarsan was derived, chiefly, from recent literature.

It is a pleasure to acknowledge the assistance and helpful criticism of friends and, notably, that of Mr. Godsoe, Pharmacist of the Massachusetts General Hospital.

G. C. S.

PREFACE TO THIRD EDITION.

This book has grown considerably since the first edition appeared, and the original name, "A Synopsis of Medical Treatment" has been criticized on the ground that it gave an inadequate idea of the scope of the book. I was the more ready to change the title because, from the first, it has been my desire to subordinate methods and to emphasize principles. Accordingly the name of the book has been changed to "Principles of Medical Treatment."

I count it a piece of rare good fortune to be able in this edition to publish new material on some of the acute infections by Dr. Edwin H. Place and on tuberculosis by Dr. John B. Hawes, 2d, men whose work in their respective fields is so favorably known as to render comment unnecessary.

G. C. S.

PREFACE TO FOURTH EDITION.

Doctor Shattuck's continued absence in France has prevented more than a careful revision of his text for minor corrections. Doctor Place and Doctor Hawes have revised and added to the text of the sections written by them for the previous edition.

W. M. L.

PREFACE TO FIFTH EDITION.

The scope of the book in this edition has been extended in important directions by new contributions from Drs. John B. Hawes, 2d, Edwin H. Place, Gerald Blake, B. Harrison Ragle and Henry M. Thomas, Jr.; and the old text has been modified or amplified in many particulars.

Attention is directed to the views expressed under the head of circulatory disorders in the infectious diseases. This subject is still so imperfectly understood that to treat it on the basis of established principles seems out of the question. Consequently it has seemed best to advance personal views and to invite criticism or suggestions from any interested member of our profession in the hope of ultimately throwing more light into this dark corner of medical practice.

Being no longer a member of the Staff of the Massachusetts General Hospital and not having been for several years in close touch with its work, no claim is made that my contributions represent the practice now prevailing there.

Special acknowledgments are due to Dr. William Henry Smith, Visiting Physician, to Mr. Joseph Godsoe, Pharmacist of the Massachusetts General Hospital and to Miss Alice B. Newell, who has exercised the most painstaking care in preparing the manuscript.

G. C. S.

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CHAPTER I.

DISORDERS OF THE CIRCULATORY SYSTEM.

CARDIAC INSUFFICIENCY.

GENERAL PRINCIPLES OF TREATMENT.

- A. REST.*
- B. DEPLETION.*
- C. STIMULATION.*
- D. SUITABLE DIET.*
- E. REGULATION OF MODE OF LIFE.*

The principles are much the same whatever the underlying cause. Treatment must, however, be regulated to suit the severity of symptoms, to meet individual needs, and for varieties of disease.

An exact diagnosis may be difficult in the presence of severe insufficiency and may not be necessary at first, but accuracy in diagnosis is very important for prognosis and for planning treatment for the future.

METHODS OF TREATMENT.

A. Rest.

1. Semi-recumbent position in bed or chair.
2. Minimum exertion.
3. Relieve discomfort and secure sleep. If there is much discomfort morphine subcutaneously is indicated.

B. Depletion.

1. **Purgation.** Obtain watery catharsis more or less profuse according to amount of edema.

When edema is absent or slight avoid excessive purgation lest exhaustion result.

Magnesium sulphate (p. 283) is useful as a purgative.

2. **Limitation of Liquids.** Total liquids, including liquid foods, should not exceed three pints in twenty-four hours. One pint in twenty-four hours is near the minimum. The patient should not be allowed to suffer from thirst. It may be relieved by sucking

cracked ice, by gargling or by the use of chewing gum unless dyspnoea prevents.

3. **Diuresis** should follow the use of digitalis when there is cardiac edema. In mild cases of insufficiency, rest, purgation and limitation of liquids without digitalis may suffice.

When edema is persistent or extreme, diuretics should be prescribed. Theobromine (p. 283) or its substitutes may be expected to act well provided the kidneys are not severely damaged. "Calomel" should not be given if the patient has nephritis because salivation may result. Theophylline may act better than theobromine in some cases.

4. **Venesection.** Indicated occasionally when there is engorgement of the right ventricle with marked evidence of venous stasis; e.g., dyspnoea, cyanosis, pulmonary edema and engorgement of neck-veins and liver.

A pint of blood or even more may be withdrawn. Venesection is contraindicated by emaciation or by marked weakness or anemia. Blood is generally withdrawn by incising a vein on the inner side of the elbow. A tourniquet may be put around the arm to render the veins prominent. The incision should be made in the long axis of the vein with the point of a sharp knife. The bleeding can be stopped with a pad and bandage. Suturing the vein is unnecessary. The blood can be withdrawn from the vein by aspiration if a suitable apparatus is at hand.

5. **Leeching.** Useful as a substitute for venesection when the latter would be undesirable or when symptoms are less severe. Leeching will generally relieve painful engorgement of the liver.

Apply a dozen leeches over the right hypochondrium and allow them to remain until they drop off. The abdomen should then be covered with a large, moist, absorbent dressing to favor oozing from the bites. A drop of milk placed on the skin encourages the leech to bite. Salt causes him to let go.

6. **Tapping.** Necessary when fluid in the chest or abdominal cavity seriously embarrasses the heart or respiration.

C. Stimulation.

Digitalis is the cardiac "stimulant" *par excellence* but it may be more accurately spoken of as a tonic. An active preparation in sufficient dose does good in almost any variety of *cardiac* in-

sufficiency. The most marked benefit may be expected in severe cases of auricular fibrillation or flutter.

Circulatory disturbances in the acute infectious diseases are comparatively little influenced by digitalis. Rarely, failure to get improvement from digitalis is due to chronic lesions of the myocardium so extensive that the heart is incapable of further response.

It is generally true that if, after pushing digitalis in a suitable case, neither benefit nor toxic effect follows within a few days *the preparation is probably inactive.*

For further information about the use of preparations of the digitalis group and about their use in emergencies, see digitalis, p. 275.

Slight recurring exacerbations of dyspnoea seem often to be relieved promptly by the use of a quickly diffusible stimulant. The following may be tried:

By mouth:

- (a) Spiritus ammoniae aromaticus (U. S.): 1 drach. (or 4 mils).
- (b) Whiskey or brandy: from $\frac{1}{2}$ to 1 oz. (or 15 to 30 mils).

Subcutaneously:

- (c) Camphor in oil: * 3 grs. (or 0.2 gm.). Inject intramuscularly.
- (d) Cocaine hydrochloride: from $\frac{1}{8}$ to $\frac{1}{4}$ gr. (or 0.008 to 0.016 gm.). It is said to be dangerous but may act very well.

Insufficiency with much pain requires morphine (p. 271). It seems to act under these circumstances as an efficient cardiac stimulant. It brings also physical comfort and psychic relief which favor recuperation. The morphine should be used subcut. under these circumstances to ensure prompt effect.

D. Diet.

Spare the patient unnecessary effort, particularly if there is much dyspnoea, by ordering food which is easy to swallow and which requires no chewing.

By frequent small feedings and by avoiding gas-producing foods seek to prevent cardiac embarrassment from distention.

* Should be specially prepared for subcut. use.

Emaciated patients should take as much concentrated nourishment as is practicable in order to strengthen the heart muscle by improved nutrition.

Fat or plethoric individuals may benefit by fasting.

The Karell diet combines the principle of limitation of fluid intake with that of relative starvation. It is suitable for well nourished patients with edema. The chief disadvantage is its monotony for the patient.

E. Regulation of Mode of Life.

To prevent relapse during and after convalescence, the mode of life of the patient must be wisely regulated; and intelligent coöperation between patient and physician is essential to this end. It is generally necessary to tell the patient something about his condition and to warn him to avoid activities which induce much fatigue and exertions which cause much dyspnoea. Judgment and caution must be exercised in dealing with an apprehensive patient lest danger be exaggerated in his mind, and harm result.

After a sufficient period of complete rest the patient should be encouraged to take regular exercise within the limits of tolerance in order to strengthen the heart by promoting hypertrophy; except that when coronary circulation is much impaired exercise is to be avoided. See angina pectoris, p. 51.

Exercise and work should be resumed very gradually under close supervision.

VALVULAR DISEASE.

CLASSIFICATION.

1. Congenital . . . { Most commonly discovered in early childhood.
2. Infectious . . . Most commonly discovered in youth.
3. Syphilitic . . . { Most commonly discovered in middle life.
4. Degenerative . . . Most commonly discovered in old age.

PATHOLOGY AND DIAGNOSIS.

Note.— Any of the lesions enumerated below may be compensated when first seen, but cardiac insufficiency generally follows in time. The chief determining factor is the severity of associated myocardial damage.

I. Congenital lesions. Pulmonic stenosis is the most common. It is seldom mistaken for other types of lesion but may easily be confused with anomalies which have similar signs and which are often combined with it.

2. Infectious lesions.

- (a) Active stage. Inflammation of valves due to presence of bacteria on the valve.
- (b) Obsolete stage. Valves deformed and scarred as a result of inflammation.
- (c) Recurrent stage. Reinfestation with inflammation at site of old lesion.

Lesions are found commonly at the mitral valve or at the aortic and mitral valves, seldom at the aortic valve alone. Occasionally the mitral, aortic and tricuspid valves are all diseased. Stenosis develops frequently. Stenosis at the aortic and mitral valves suggests tricuspid stenosis as well.

Obsolete lesions if well compensated may give no symptoms. They first attract attention by diminished cardiac efficiency or by failure of compensation.

In the active or recurrent stage the symptoms are those of general infection with or without failure of compensation.

3. Syphilitic lesions. The lesion generally begins in the ascending aorta and extends subsequently to the aortic valve. The earliest signs may be slight dilatation of the arch and the murmur of aortic roughening. Later, that of aortic regurgitation may appear and, finally, relative mitral regurgitation may develop.

A lesion of the aortic valve only, in a young adult, suggests syphilis as its cause. Aneurism or coronary endarteritis may coexist as part of the same process.

Evidence of an old syphilis supports the diagnosis.

4. Degenerative lesions. As in syphilis, the signs point to a lesion at the aortic valve but evidence of syphilis is lacking. The background is one of senility and general arteriosclerosis to which sclerosis of the aorta and of the aortic valve is incidental. There may be dilatation of the arch and evidence of myocardial degeneration, perhaps also angina pectoris.

PREVENTION OF RECURRENCE.

- (a) Search for and eliminate all foci of infection in sinuses, teeth, tonsils, or genito-urinary tract.

(b) Diseased tonsils, as a rule, should be removed at the first suitable opportunity. It is dangerous to remove them when acutely inflamed.

(c) Warn the patient against exposure and insist that he attend promptly to ailments, even if slight, and avoid mental strain, and any physical exertion which produces dyspnoea or fatigue.

TREATMENT.

I. Congenital and Obsolete Infectious Lesions of Valves.

Treat according to the general principles given above.

They must be modified for the individual with regard to severity, duration, nature and cause of symptoms.

II. Active Infectious Lesions of Valves.

A. Principles of Treatment. As for acute infections in general (p. 75) and for cardiac insufficiency if present.

1. Rest in bed.
2. Minimum exertion.
3. Dilution of toxins.
4. Elimination of toxins.
5. Maintenance of nutrition.
6. Stimulation *p.r.n.*

Note.—The infection may be acute, subacute or recurrent. The chief dangers are from toxemia, exhaustion, cardiac dilatation or embolism.

Evidence of recent preexisting rheumatic fever, chorea or tonsillitis strengthens a diagnosis of active endocarditis.

B. Methods. (a) Good nursing is very important. The nurse should promote comfort by attention to details, should feed the patient and, whenever possible, spare him exertion or annoyance.

(b) To dilute toxins and to favor elimination order abundance of liquids. Have intake and output recorded. If cardiac dilatation threatens or if there is edema liquids must be restricted.

(c) Feedings should be frequent, the food nutritious, and the amount regulated by digestive power. Liquids and soft solids are preferable in severe cases because easy to swallow.

(d) Stimulants are to be avoided unless clearly necessary because embolism is to be feared and stimulation might favor it.

(e) Tachycardia may sometimes be reduced by an ice-bag placed over the praecordia.

C. Convalescence. To minimize danger of relapse keep the patient in bed and as quiet as possible for weeks or months after the pulse and temperature have returned to normal. Permanent damage nearly always remains. The degree of possible improvement depends on the location and extent of the lesions and on the recuperative power of the patient. Therefore, guard against strain, and treat malnutrition or anemia, if present, to promote hypertrophy of the heart.

III. Syphilitic Lesions of Valves require antisyphilitic medication as well as general measures for cardiac insufficiency.

Little improvement can be expected, however, unless the diagnosis be made before extensive and irreparable damage has occurred.

IV. Degenerative Lesions of Valves may be treated on general principles with certain modifications as follows:

(a) When blood-pressure is high, nitrates may be of value to lighten the work of the heart by lowering pressure temporarily.

(b) Thin patients require the maximum nutrition to strengthen the heart. They should undergo little or no purgation unless edema is considerable.

(c) Regulation of life is of the utmost importance during and after convalescence. The patient's coöperation must be secured.

(d) Many of these patients should take digitalis and salts more or less frequently for long periods or for the rest of their lives. The best dosage for the individual can be determined only by trial. Several small doses per week taken at regular intervals may be sufficient. Warn the patient not to be without his medicine or to give it up on his own responsibility. The heart muscle may, perhaps, be so changed that it cannot respond to any form of treatment.

HYPERTENSION WITH CARDIAC INSUFFICIENCY.

Etiology and Symptoms. Hypertension is commonest in chronic nephritis and is seen also in arteriosclerosis. The hyper-

tension and left ventricular hypertrophy develop gradually. Symptoms of insufficiency often increase so gradually as to be disregarded by the patient for months. The condition of the patient is generally more critical than the signs would seem to indicate. Acute pulmonary edema is common in these cases. Many of them show signs of toxemia attributable to deficient renal elimination.

- Treatment.**
1. Methods for cardiac insufficiency (p. 17).
 2. Reduce the work of the heart by lowering blood-pressure temporarily unless the urinary output falls in consequence.
 - (a) Vaso-dilators, *e.g.*, nitroglycerin (p. 281), lower blood-pressure temporarily and often promote diuresis also.
 - (b) Purgation, diuresis, venesection and measures tending to relieve toxemia or to improve the circulation seem to favor if not to cause reduction of pressure in hypertension.
 - (c) Fasting for a day or marked restriction of food for several days may benefit plethoric individuals. It is one of the surest means of lowering pressure. Emaciation must be avoided because it increases cardiac weakness.
 - (d) Relief from psychic strain, *e.g.*, business cares, may be followed by a fall in pressure.
 - (e) Removal of foci of infection, *e.g.* drainage of pus by extraction of teeth, etc.
 3. When toxemia is present reduce it by:
 - (a) Purgation or diuresis.
 - (b) Restriction of food, and of protein in particular.
 - (c) Hot-air baths or hot soaks if cardiac symptoms permit.
 4. If toxemic symptoms persist after improvement in the circulation they are probably uremic in origin and should be treated accordingly (p. 71).

PULMONARY EDEMA

I. With Hypertension.

Note.—Occurs commonly and characteristically in hypertension. The attack generally follows exertion and may not have been preceded by marked symptoms of cardiac insufficiency.

The onset is sudden and alarming.

The symptoms in severe cases are marked dyspnoea, cyanosis, wheezing, cough, and pinkish, frothy expectoration. There may be precordial pain.

Treatment. Mild attacks may pass off after a little rest. Severe attacks require energetic and prompt treatment as follows:

1. Prop the patient up so he can sit upright without effort.
2. Give morphine sulphate, gr. $\frac{1}{4}$ (or 0.016 gm.) atropine sulphate, gr. $\frac{1}{100}$ to $\frac{1}{50}$ (or 0.00065 to 0.001 gm.) and nitroglycerin, gr. $\frac{1}{100}$ to $\frac{1}{50}$ (or 0.00065 to 0.001 gm.) subcutaneously at once.
3. Unless improvement begins promptly, the nitroglycerin should be repeated, and venesection may be required.
4. The following drugs may be of service.

By inhalation: Amyl nitrite: 5 m. (or 0.3 c.c.).

By mouth:	$\left\{ \begin{array}{l} \text{Spiritus ammoniae aromaticus: } 1 \text{ drach. (or} \\ \quad 4 \text{ c.c.)} \\ \text{Spiritus aetheris compositus: } * 1 \text{ drach. (or} \\ \quad 4 \text{ c.c.)} \\ \text{Whiskey or brandy: from } 4 \text{ drach. to } 1 \text{ oz.} \\ \quad (\text{or } 15 \text{ to } 30 \text{ c.c.)} \end{array} \right.$
Subcutaneously:	$\left\{ \begin{array}{l} \text{Cocaine hydrochloride: } \frac{1}{4} \text{ gr. (or } 0.016 \text{ gm.)} \\ \quad \text{said to be dangerous.} \end{array} \right.$

Intravenously: Strophanthin: p. 279.

5. Do not attempt to transport the patient until immediate danger has passed.
6. Rest in bed is advisable for a few days to allow the heart to recover.
7. Digitalis, purgation, etc., may be needed.
8. Subsequent regulation of life is essential to avoid recurrence.

II. Without Hypertension.

Pulmonary edema may appear in cardiac insufficiency from any cause. It is common in mitral stenosis, but seldom acute enough to require special treatment. When severe it should be treated as in hypertension, except, that the blood-pressure being normal or low, nitrites are of doubtful value and may perhaps do harm.

Pulmonary edema occurs also in infectious diseases. In pneumonia it may be very acute, but is not necessarily of cardiac origin. For treatment see p. 47.

* "Hoffmann's anodyne."

CIRCULATORY DISORDERS OF INFECTIOUS FEVERS AND SEPSIS.

Note.— Before this subject can be put on a satisfactory basis more must be learned about the causes and nature of the circulatory changes and about the action of drugs on the circulation in infectious fevers.

The subject will be discussed in the light of what seem to be facts under the following heads:—

A. General Circulatory Disorders.

1. Tachycardia.
2. Bounding pulse.
3. Wiry pulse.
4. Dicrotic pulse.
5. Thready pulse.
6. Syncope.
7. Circulatory collapse or toxemic shock.
8. Bradycardia (not due to block).

B. Myocardial Disorders.

1. Infection of myo, endo, or pericardium.
2. Heart-block.
3. Malnutrition of myocardium.

C. Disorders of Pulmonary Circulation.

1. Toxic edema:

(a) Acute.
(b) Insidious.
(c) Recurrent.
2. Obstructive lesions:

e.g.	(a) Embolism of pulmonary artery or of its large branches.
	(b) Very extensive consolidation.

Note.— The conditions in Group A, above, are attributable chiefly to toxemia acting probably on the nervous system and to some extent on the myocardium and blood-vessels as well.

Variations, often rapid, in the rate and character of the pulse occurring entirely independently of treatment are very common. They may be most difficult of interpretation and may lead to false opinions on the effects of treatment. Some of the changes are coincident with and probably dependent upon changes of body-temperature. A certain degree of circulatory change is normal in health.

*A. PROPHYLAXIS IN GENERAL.***To Ward off Serious Circulatory Symptoms.**

- | | |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Combat toxemia: | <ul style="list-style-type: none"> (a) Neutralize toxin with antitoxin when practicable. (b) Dilute toxins. (c) Promote their elimination. |
| 2. Conserve patient's strength: | <ul style="list-style-type: none"> (a) Promote comfort. (b) Minimize exertion. (c) Prevent anxiety. |
| 3. Avoid mechanical handicaps to circulation: | <ul style="list-style-type: none"> (a) Prevent abdominal distention. (b) Recumbent posture with head low is best when comfortable for the patient. |
| 4. Maintain nutrition: | <ul style="list-style-type: none"> (a) Careful attention to diet with due regard to the individual and to circumstances. (b) Free use of alcohol is beneficial in some cases. It is harmful in others. See Alcohol, p. 301. |
| 5. Stimulants: | <ul style="list-style-type: none"> (a) An abundance of cool, fresh air at all times in the sick room acts as a tonic. (b) Drugs should be used only when specially indicated. (c) Sponge baths are beneficial in suitable cases, see Typhoid, p. 87. |
| 6. Prepare for emergency in serious cases: | <ul style="list-style-type: none"> (a) Have saline or glucose solution kept in readiness. (b) Have blood of patient typed and know where to get donor if needed for transfusion. |

SYMPTOMATIC TREATMENT.

1. **Tachycardia** or acceleration, with little change in pulse-wave or blood-pressure, is usual with slight fever in mild or early infections. Nervousness or anxiety may be a factor. Do not overlook hyperthyroidism.

(a) Slight tachycardia is unimportant.

(b) Tachycardia of 120 or over may be followed by more serious symptoms. An ice-bag kept over the heart seems to slow it in some cases.

2. "**Bounding pulse**"; wave large, rising and falling quickly. Pulse pressure is increased by rise of systolic or fall of diastolic pressure or by both acting together.

This type of pulse is usual in the early stages of severe infections with considerable fever and may be followed by more serious circulatory changes with a rapid fall in blood-pressure. (It is seen also in nervous states without fever.)

(a) Avoid cardiac depressants if the disease is of a serious nature.

(b) An ice-bag may be tried to slow the heart.

(c) Stimulants are contraindicated.

3. "**Wiry pulse**"; wave small, vessel contracted, systolic pressure generally normal, sometimes increased. This type of pulse is seen occasionally in pneumonia and probably in other diseases. Graver circulatory changes with "thready pulse" or pulmonary edema may follow rapidly.

(a) Depressants are dangerous.

(b) When the pulse rate exceeds 120 it may be advisable to try digitalis in the hope of forestalling graver circulatory changes.

4. **Dicrotic pulse** and the "water-hammer pulse" indicate low diastolic pressure. The systolic pressure as a rule is slightly reduced as well. The circulatory disturbance seems to be primarily due to relaxed vessels. The dicrotic pulse is most common in typhoid in which disease it is not a serious symptom. The water-hammer pulse in the absence of valve lesion seems to indicate a more severe grade of vascular relaxation which may be followed by circulatory collapse.

(a) Rely mainly on general supportive measures.

(b) Copious ingestion of fluid is particularly important.

(c) Keep the head low.

5. "**Thready Pulse**," small, weak, rapid and "running." Beats are often unequal and sometimes slightly irregular. The systolic pressure is much reduced and the diastolic pressure is

generally lowered too, but the pulse pressure is small. This type of pulse is common in the later stages of severe infections. Probably both myocardium and vessels are at fault. Circulatory collapse may follow gradually or rapidly. Sudden death from myocardial weakness may ensue.

- (a) Measures to combat toxemia are urgently required.
- (b) Copious ingestion of fluid should be insisted upon unless there is pronounced weakness of the myocardium or pulmonary edema.
- (c) When sufficient fluid cannot be taken by mouth, salt or glucose solution should be used by rectal enema several times daily or by rectal seepage.
- (d) In more urgent cases suitable solutions can be used by hypodermoclysis or intravenously. About a pint should be given at a time. When the intravenous route is used the fluid must be allowed to run slowly and the pulse must be carefully watched meanwhile. If, after initial improvement, it loses force or shows the least irregularity, stop the transfusion at once lest cardiac dilatation result.
- (e) Transfusion with blood or with preserved corpuscles may be expected to have a more lasting effect than solutions. Do not raise the patient's head higher than comfortable breathing demands lest syncope or collapse ensue. The best position for most cases is flat with but one thin pillow under the head.
- (f) Intravenous medication with stimulants of the digitalis group or powerful vaso-constrictors such as adrenalin should be given slowly and not more than half the full dose should be used at one time. It is better to repeat the dose in a short time or at intervals than to cause a marked and sudden rise of blood-pressure which is apt to be followed by a disastrous fall.

Caffeine, or strichnine may be prescribed for their supposed tonic effect. Neither is likely to have much direct action on the pulse.

Full doses of digitalis may be tried by mouth. It may perhaps do good when myocardial weakness is an important factor.

6. **Syncope** may occur in fevers when blood pressure is low. Unless quickly relieved it may result in death.

- (a) Prevent it by keeping the head low when the circulation is weak.
- (b) Relieve it by lowering the head and by raising the foot of the bed moderately.

7. **Circulatory Collapse due to "Toxemic Shock"** may develop rapidly or gradually in severe febrile cases and in some other conditions. The sequence of events seems to be relaxation of the blood vessels, fall of diastolic pressure, deficient return of blood to the heart, resulting impaired coronary circulation, and consequent secondary cardiac weakness. Actual myocardial damage may co-exist sometimes.

It is important to distinguish as clearly as possible between "toxemic shock" and circulatory collapse due essentially to myocardial weakness because treatment suitable for the former is likely to prove fatal to patients suffering from the latter condition.

The milder forms of "shock" may recur in severe cases of typhus fever, sometimes in the day-time, more often late at night.

Severe grades are seen in typhus, in typhoid and in pneumonia. Recovery is possible but death the rule.

- (a) Remove pillows and raise foot of bed about twelve inches. Do not lower it again for hours or days and then do so gradually.
- (b) Administer something producing a prompt reflex vascular response, e.g. a drink of hot tea, or of hot water, a spoonful of brandy or an intramuscular injection of a locally irritating substance such as ether, alcohol, or perhaps camphor.
- (c) To promote return of blood to the heart, the limbs and abdomen may be tightly bandaged so as to squeeze the blood out of the veins. This measure has proved very effective.
- (d) Solutions by hypodermoclysis or intravenously generally cause marked and rapid improvement which may be maintained for hours or days. (See important facts under "Thready Pulse," 5.(d) above.)

- (e) The use of powerful stimulants of the digitalis or vasoconstrictor groups in full doses intravenously is probably unwise lest a marked rise of blood-pressure be followed rapidly by a corresponding fall. The writer has seen this happen repeatedly with serious consequences. Smaller, repeated doses would probably do good.
- (f) The work of Porter,* on traumatic shock contains much that may prove of value in the treatment of "toxemic shock."

8. "Simple" Bradycardia (pulse rate above 40).

Common in convalescent stage of fevers and particularly in typhus fever. (In some individuals bradycardia is constant in health.)

- (a) Physical exertion should be restricted as a precaution in post febrile cases.
- (b) No other treatment is required.

B. TREATMENT FOR MYOCARDIAL DISORDERS.

1. Myocardial infections require the same general management as "Acute Infectious Lesions of Valves," p. 27, Sect. II. See also "Methods of Treatment" under "General Circulatory Disorders," (p. 17).

Endocardial and pericardial lesions are generally associated with infection of the myocardium. They require the same treatment except that pericarditis may demand aspiration or surgical drainage.

2. Heart-block may be due to a myocardial lesion directly affecting the bundle of His, to digitalis or to both factors combined when neither alone would produce it. In such cases a small dose of digitalis may induce block. Block is not usually associated with severe decompensation but symptoms may be serious during the transition from sinus to nodal rhythm.

As a rule drugs of the digitalis group should be omitted at the first sign of block.

Other treatment is symptomatic as for "General Circulatory Disorders" (p. 17).

* Boston Med. and Surg. Jour., May 16, 1918, p. 657.

3. **Malnutrition of Myocardium** may cause serious circulatory weakness in the presence of emaciation or severe anemia.

- (a) Special attention should be given to nutrition.
- (b) Alcohol may be of service as an appetizer. A glass of sherry before meals with or without bitters or containing a few minims of tincture of Nux vomica, a glass of whiskey and water, or one of beer with meals, if palatable to the patient, may do good.

Other patients only capable of taking liquids and in a condition of semistarvation may sometimes take large quantities of alcohol with benefit. In such cases it seems to act as a food. See Alcohol, p. 301.

4. **Sudden death** in acute febrile conditions, frequently attributed to pulmonary embolism, seems more often to be caused by myocardial weakness without gross lesion.

C. DISORDERS OF THE PULMONARY CIRCULATION.

I. Toxemic edema.

- (a) The Acute Form has two varieties.

(1) An attack which supervenes at the onset of pneumonia with severe dyspnoea, cyanosis and signs of edema may be due in part to mechanical causes. Venesection and should be performed and a quickly acting, powerful stimulant like strophanthin 0.5 mgm. intravenously may perhaps do good.

A hypodermic injection of morphine gr. $\frac{1}{6}$ to $\frac{1}{4}$ (or 0.01080 to 0.0162 gm.) with perhaps atropine gr. $\frac{1}{100}$ to $\frac{1}{60}$ (or 0.00065 to 0.00110 gm.) if given promptly, may be sufficient in milder attacks.

(2) Acute edema coming in lobar pneumonia after the fifth day or later is generally hopeless, but I have seen a patient rally quickly from two extremely severe and sudden attacks after receiving atropine gr. $\frac{1}{60}$ (or 0.00130 gm.) hypodermically. He made a good recovery. Venesection might have served but would have left the patient weaker. Strophanthin might have been tried. Morphine with the atropine may be advantageous provided there is edema alone, but when the frothy sputum of edema is combined with the thick secretion of bron-

chitis, morphine should be used with caution lest by stopping cough this secretion, which cannot readily be absorbed, be retained in the lungs. Similar conditions are seen in some severe cases of typhus fever and pneumonic influenza. Treatment as above described may be tried but is not likely to save the patient.

- (b) Insidious edema varying from slight "hypostatic congestion" to the most severe forms may develop in various infections after a week or more of high fever. It was common in the severe broncho-pneumonic cases of influenza in the recent pandemic.
 - (1) For "hypostatic congestion" measures to support the circulation (see "Prophylaxis in General" above) and frequent change of position are usually efficacious, (see under typhoid, nursing, p. 83.)
 - (2) Edema which increases gradually and becomes severe in spite of prophylactic measures, stimulants of the digitalis group, purgation and atropine, is probably hopeless.
- (c) Recurrent edema has been observed repeatedly in typhus fever and in infected penetrating wounds of the chest and it probably occurs in other severe infections. It is characterized by dyspnoea, and white, frothy expectoration developing rather gradually in the late afternoon, or at night and having a tendency to recur on succeeding days at about the same hour. The contents of the sputum cup is the key to diagnosis and treatment. There may be an associated bronchitis. When this is the case there is mixed with the froth a larger or smaller proportion of thick mucoid or muco-purulent material. In cases uncomplicated by bronchitis morphine gr. $\frac{1}{6}$ (or 0.01080 gm.) and atropine gr. $\frac{1}{20}$ (or 0.000540 gm.) gives prompt relief. When the attack begins in the afternoon this dose may need to be repeated during the night. When bronchitis co-exists relief is less marked and morphine, if repeated, must be used with caution lest the bronchitic secretion be retained.

2. Obstructive Lesions.

- (a) Very extensive pulmonary consolidation throws added

strain on the right ventricle but severe toxemic is generally associated with it. The treatment is symptomatic.

- (b) Pulmonary embolism, when extensive, is rapidly fatal. Less severe cases must be treated symptomatically.

ANGINA PECTORIS.

Definition. Pain or distress attributable to spasm, or to occlusion, of a coronary artery.

Spasm is generally associated with syphilitic or degenerative change in the vessel-wall, but lesions may be confined to other parts of the heart or to the aorta, and "neurotic angina," in which there is no known lesion, is rather common. Occlusion may be thrombotic or embolic.

Angina may be indicative of beginning cardiac exhaustion or of deficient blood-supply to the myocardium.

Etiological Classification of Angina Pectoris.

1. Syphilitic: common in men of early middle age.
2. Degenerative or arteriosclerotic: common in old men.
3. Embolic: seen in endocarditis or intracardiac thrombosis.
4. Neurotic: common in young women.

DIAGNOSIS.

An accurate history of the mode of onset, duration and radiation of the pain and the discovery of an adequate background for the disease is of the greatest importance. Pain on exertion suggests angina. Angina in a young or middle-aged man suggests syphilis.

A complete physical examination may show nothing important. Angina in a young woman suggests psychic trauma. Painless angina, otherwise typical, is seen rarely.

I. SYPHILITIC ANGINA.

Pathology. Syphilitic changes in the aorta, aortic valves or coronary arteries, diminishing their circulation are generally present.

Etiology. A late manifestation of syphilis; commonest in middle life.

Prognosis. The prognosis is very uncertain.

A. TREATMENT IN GENERAL.

1. Antisyphilitic measures.*
2. Regulation of life to reduce demands on the heart to what it can meet is of the utmost importance.
 - (a) Avoid anything known to bring on angina in the individual, e.g., exercise after meals.
 - (b) Avoid *physical* and *mental* strain.
 - (c) Avoid distention of the stomach and bowels.
 - (d) Food and liquids should be taken in moderation.
 - (e) Tobacco and alcohol in great moderation if at all.
 - (f) Bowels should be kept free.
3. Cardiac insufficiency, if present, requires appropriate treatment on general principles.
4. Small doses of digitalis often help to reduce the number of attacks even when the usual signs of cardiac insufficiency are absent. Theobromine sodio-salicylate, grs. 5 t.i.d., or barium chloride, grs. $\frac{1}{10}$ t.i.d., may be tried for the same purpose.
5. At the first sign of an attack the patient should take nitro-glycerin (p. 281) or amyl nitrite, repeat it in a few minutes if not relieved and remain quiet for a time after the attack has passed. An expected attack can sometimes be prevented by timely use of nitro-glycerin. The drug must be always accessible without effort. Nitro-glycerin should be chewed and absorbed in the mouth and amyl nitrite taken by inhaling it from a handkerchief. It is important to provide pearls which break easily but not spontaneously if amyl nitrite is to be used.

B. TREATMENT OF ANGINAL ATTACKS.

If called to treat an attack of angina use nitro-glycerin subcutaneously or amyl nitrite or both immediately. Repeat the dose in a few minutes if the patient is not relieved. If nitro-glycerin gives no effect in repeated doses amyl nitrite may perhaps relieve. If the pain is unusually severe and obstinate morphine should be injected.

Do not attempt to transport the patient and do not allow him to make the slightest exertion for a time after the symptoms have passed. Rest in bed is advisable after a severe attack.

* Arsphenamine should not be used in the presence of severe cardiac decompensation.

II. DEGENERATIVE ANGINA.

Pathology. Coronary sclerosis and chronic myocardial degeneration, with or without fibrous myocarditis, will often be demonstrable as part of a widespread arteriosclerosis.

Prognosis. Years of life may be possible but sudden death may occur at any time.

Treatment. 1. Regulate life to avoid strain.

2. When there is any cardiac insufficiency the patient should take digitalis and salts for long periods. The dose required for the individual must be determined carefully by trial.

3. Digitalis, theobromine, potassium iodide or barium chloride in small doses may limit the number of attacks or even prevent them.

4. If an old syphilis be suspected give potassium iodide and protiodide of mercury in moderate doses.

5. The treatment for the attack is the same as in syphilitic angina.

III. EMBOLIC ANGINA.

Vaso-dilators are likely to give little relief. Morphine is usually required in large doses. Death may come suddenly at onset of symptoms.

IV. NEUROTIC ANGINA.

Pathology. No characteristic changes recognized.

Etiology. Commonly due to excess in tea, coffee, or tobacco, to fear or emotional shock and often associated with debility. It is seen, almost exclusively, in neurotic young women.

Prognosis. Death is not to be expected and the chance of complete cure is excellent.

Treatment. 1. Remove the cause when possible.

2. General hygienic measures.

By these means recurrence can be prevented.

The attack is generally too brief and mild to require treatment, but when severe, it should be treated like organic angina.

Note.—Cardio-spasm may simulate angina pectoris.

CHAPTER II.

NEPHRITIS.

CLASSIFICATION.

1. Acute Renal Irritation.
2. Acute Nephritis.
3. Chronic Nephritis.
4. Syphilitic Nephritis.
5. Arteriosclerotic Degeneration.
6. Passive Congestion.

PATHOLOGY AND DIAGNOSIS.

This classification aims to separate only the more important types of nephritis which can be recognized clinically and which require different treatment.

Acute renal irritation is to be expected in the presence of acute general infections with high fever. It is not a true nephritis and it has no important significance. Cloudy swelling of the kidneys is probably associated with it.

Glomerulo-nephritis, acute, subacute, or chronic results, as a rule, from infection with the streptococcus viridans and this type of nephritis includes the great majority of all cases of true nephritis. Recovery may take place after the acute stage or the disease may become chronic and incurable. The stages and phases are as follows:

<i>Stages</i>	Acute	Subacute	Chronic	<i>Phases</i>	Latent	Active
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Any stage may be without symptoms. The urine in the early acute stage may be negative. In chronic cases there is no albumen and little sediment at times, but the specific gravity is constantly low.

In adults, active phases of the subacute stage are frequently mistaken for acute nephritis.

Left-ventricular hypertrophy and hypertension develop gradually and there is a progressive fall in specific gravity associated with an increase in amount of urine.

The last stage shows marked left ventricular hypertrophy, a blood-pressure generally over 200 mm. of mercury and a urine of very low gravity, containing little or no albumen and a scanty sediment. At this stage many of the glomeruli and much of the parenchyma has been replaced by connective tissue, and shrinkage has followed so that the kidneys are much diminished in size. The chief dangers are from uremia or from cardiac insufficiency secondary to hypertension. In the absence of arteriosclerosis a provisional diagnosis of chronic nephritis may often be made by the evidence of hypertension and of cardiac hypertrophy. Cases of chronic nephritis complicated with arteriosclerosis are liable to apoplexy.

Syphilitic Nephritis is generally regarded as an unusual form of acute nephritis. It occurs, according to Osler, most commonly in the secondary stage of syphilis within six months of the primary lesion and it resembles glomerular nephritis. Gumma of the kidney is rarely seen but it is probable that some instances of renal arteriosclerosis are of syphilitic origin. Signs of an active syphilis in the presence of a nephritis suggest but do not prove that the two are related. The blood-pressure is not usually much increased.

Arteriosclerotic Degeneration of the kidney is most common in old age. It may be part of a widespread arteriosclerosis or it may be manifested chiefly in the kidney. There occurs a non-inflammatory destruction of parts of the kidney dependent on sclerosis of the arteries supplying those parts. Local shrinkage and irregularity or roughness of the surface results.

The urine, at first, may show considerable albumen and some blood and casts. Later it resembles that of chronic nephritis. Hypertension and left ventricular hypertrophy are generally well marked in the later stages of renal degeneration.

The greatest dangers are from cardiac insufficiency or cerebral hemorrhage. Typical uremia occurs rarely if at all in pure degenerative cases but there is often more or less chronic nephritis combined with the degenerative lesions. Chronic lead-poisoning, gout or syphilis may be important etiologically.

Passive Congestion is secondary to congestion in the venous circulation. Therefore, it is commonly symptomatic of cardiac insufficiency. The urine is high colored, scanty and of a high

gravity. Albumen and casts are found, varying in amount and number. There are no uremic symptoms, and the urine clears rapidly after removal of the congestion.

Passive congestion may mask an acute nephritis, especially in the active stage of endocarditis.

Mixed lesions are very common and glomerulo-nephritis is often combined with arterio-sclerotic degeneration. Either process may predominate.

Less common lesions. The form of acute nephritis produced by irritant poisons such as corrosive sublimate is of the tubular variety.

A form of chronic nephritis with hypertension may result from lead-poisoning.

In chronic suppurative conditions, particularly when related to tuberculosis or syphilis, amyloid degeneration of the kidney may develop.

There are other unusual or atypical renal degenerations or nephritides difficult to classify.

ACUTE RENAL IRRITATION.

Treatment. The signs of irritation can be much reduced by the free administration of water. The water dilutes the irritating substance and promotes excretion by stimulating diuresis. No other direct treatment is needed.

Caution. Before discharging the patient look for evidence of nephritis.

ACUTE NEPHRITIS.

PRINCIPLES OF TREATMENT.

A. Reduce the demands on the kidney by:

1. Rest in bed.
2. Elimination by other channels. { Purgings.
Sweating.
3. Suitable diet.
4. Limitation of liquids in suitable cases.

B. Maintain nutrition.

C. Avoid exposure to cold or to sudden cooling.

D. Drugs should be used only when indicated; never by routine.

METHODS OF TREATMENT.

- Sweating.**
1. Hot-air bath in bed or chair.
 2. Hot tub-bath.
 3. Hot wet pack.
 4. Electric light bath.
 5. Turkish or Russian bath.

Hot-air baths are best given in bed. If the baths cause profuse sweating they may be used daily for an hour or more. If sweating does not begin promptly a drink, hot or cold, may start it, or pilocarpine (gr. $\frac{1}{6}$ or 0.01080 gm.) may be administered subcutaneously. Pilocarpine may cause pulmonary edema and is, therefore, contraindicated when the heart is weak, the lungs congested, or the patient unconscious. Some patients who sweat little at first respond well to subsequent baths.

If sweating cannot be induced, if the pulse becomes weak, or if the patient develops cardiac symptoms during a bath the baths must be given up. They should not be ordered for an unconscious patient without consideration followed by close observation.

Hospitals provide apparatus for the hot-air bath. In private houses it can be improvised with barrel-hoops or strong wire to arch the bed, an oilcloth from the kitchen table as a rubber sheet, an elbow of stovepipe and a kerosene lamp to provide the heat; or the patient, without clothing, may sit in a cane-bottomed chair under which stands a small lamp. Blankets are then wrapped around the chair and the patient together, leaving no hole for the heat to escape.

Care must be taken not to set the blankets on fire.

The value of sweating for nephritis has been questioned. In non-uremic cases with edema, I believe that it often promotes diuresis.

Purgation. Obtain watery catharsis to reduce edema and to increase elimination of toxic material by the intestinal tract. Magnesium sulphate, or compound jalap powder with additional potassium bitartrate, or elaterium are good for this purpose (p. 283).

In the absence of edema, purgation should not be excessive, lest the patient's nutrition suffer.

Diet. Proteids, meat broths, spices, acids and alcohol irritate the kidney and are to be avoided during the acute stage.

Milk is an exception to the rule against proteid because experience shows that it is not injurious. A diet exclusively of milk becomes monotonous if long continued and such large quantities are needed to maintain nutrition that the fluid part may tend to increase edema.*

Salt seems not to be harmful as a rule. When, however, edema persists in spite of other treatment, a "salt-free" diet may be tried, *i.e.*, salt is not to be added to food either before or after cooking. This change is followed occasionally by rapid disappearance of the edema. If deemed advisable the phosphate in milk can be precipitated by adding 5 grs. (or 0.3 gm.) of calcium carbonate per pint of milk.

Diet List (incomplete). Milk, cream, butter, sugar, junket, ice cream, bread, toast, cereals, rice, potato, macaroni, sago, tapioca, spinach, lettuce, sweet raw fruits or stewed fruits.

In convalescence enlarge diet cautiously on account of danger of relapse. When returning to proteid foods allow eggs first, then fish and lastly meat, red or white.

Liquids, including liquid foods, should be limited strictly when there is anasarca or when they are not being fully excreted. One pint in twenty-four hours may be enough. Cracked ice may be used for thirst, but, if the patient suffers, more liquid should be allowed.

Water is an excellent diuretic when freely excreted. It dilutes irritating substances and favors their elimination.

Nutrition. The quantity of food to be prescribed depends on the severity of the nephritis, the physical strength, and the state of nutrition of the patient. Strong, well-nourished patients having severe nephritis may benefit by fasting for a day followed by very small quantities of food for several days. A feeble, emaciated and anemic person should receive food enough to maintain body-weight.

Exposure. To prevent chill, keep room at equable temperature and let patient wear flannel or lie between blankets.

Medication. Irritating diuretics, such as calomel, are dangerous in all forms of nephritis.

* Three quarts of milk furnish about 2000 calories which is scant for an adult.

Theobromine, theophylline and apocynum are useless and may perhaps do harm in acute nephritis.

Mild saline diuretics or alkaline mineral waters may be valuable, particularly in convalescence, but it may, perhaps, be wiser to avoid them in severe cases during the early stage.

For anemia, iron may be tried, e.g., "Blaud's Pill," or "Basham's Mixture" (Liquor ferri et ammonii acetatis U. S.) which contains iron and acts also as a mild diuretic.

Prophylaxis. If it appears that the tonsils were the point of entrance or the original seat of disease their removal at a suitable time should be advised.

Uremia. For treatment see p. 71.

CHRONIC NEPHRITIS.

PRINCIPLES OF TREATMENT.

1. Adequate nourishment is essential because the disease is chronic and a cure not to be expected.
2. Limit demands on the kidney and guard against uremia by (a) diet, (b) elimination.
3. Guard against cardiac insufficiency by avoiding physical and mental strain.
4. Avoid exposure to cold.

METHODS.

Methods are the same in general as for acute nephritis, but they must be applied with regard to the condition of the patient and the stage and severity of the disease.

Avoid unnecessary restrictions. A too monotonous diet leads to malnutrition.

The Active Phase may be treated as acute nephritis for a short time or when there is doubt of the diagnosis, but chronic cases should be treated as such as soon as possible because adequate nutrition is important for them and their diet should be more liberal.

Latent phase: subacute, or chronic:

1. Restrict more or less the following:

<i>(a)</i> Meats.	<i>(d)</i> Alcohol.
<i>(b)</i> Meat broths.	<i>(e)</i> Acids.
<i>(c)</i> Spices.	<i>(f)</i> Salt.

2. To favor elimination of toxic material the following may be advised:

- (a) A saline cathartic every second, third, or fourth day.
Bowels must be kept free.
- (b) Hot tub-baths, Russian, or Turkish baths, once or twice weekly.
- (c) Alkaline mineral waters with meals.

3. **Uremia.** For treatment see p. 71.

4. **Cardiac Insufficiency** demands prompt recognition and treatment. It results commonly from hypertension, p. 29.

SYPHILITIC NEPHRITIS.

1. Apply principles advised for acute or chronic nephritis according to the severity and symptoms of the case.

2. Iodide and mercury or salvarsan should be used in small doses.

3. Watch urine and omit mercury if renal irritation increases under treatment. When the diagnosis is correct the urine generally improves promptly. As there are no characteristic signs mistakes of diagnosis easily occur.

ARTERIOSCLEROTIC RENAL DEGENERATION. TREATMENT.

1. Search for a cause of arteriosclerosis. If such can be found and if it is believed still to be operative treat it appropriately.

Such causes are, e.g., (a) chronic lead-poisoning; (b) gout; (c) syphilis; (d) prolonged tension of responsibility.

2. Nutrition must be maintained.

3. Limit the demands on the kidney by moderate restriction of:

- | | |
|------------------|--------------|
| (a) Meats. | (d) Alcohol. |
| (b) Meat broths. | (e) Acids. |
| (c) Spices. | |

4. *Avoid physical and mental strain* to guard against (a) cardiac insufficiency; (b) cerebral hemorrhage.

5. Cardiac insufficiency, when present, should be treated with reference to its probable cause, e.g.:

- (a) Degenerative valve lesion, p. 29.
- (b) Degenerative myocardial lesion, p. 55.
- (c) Hypertension, p. 29.

6. Mild toxemia may clear up under cardiac treatment if the heart is at fault.

Alkaline diuretics may be of use.

Methods advised for uremia may be used if toxemia be severe.

PASSIVE CONGESTION OF THE KIDNEY.

The treatment is that of the cause of the stasis.

UREMIA.

Note.—Uremia is an intoxication of unknown nature, common in severe acute nephritis and in chronic nephritis, and particularly so in exacerbations of the subacute stage of chronic nephritis.

Symptoms vary much in degree. There may be mental sluggishness, drowsiness or coma, loss of appetite, nausea or vomiting, muscular twitchings or convulsions, headache, delirium, disturbance of vision, transient ocular paralysis, paresis of the extremities or paroxysmal dyspnea. The urine is usually scanty or suppressed. Retinitis and Cheyne-Stokes respiration are common. The onset may be gradual, and with slight signs, or relatively acute and severe. Edema may be present or absent.

METHODS OF TREATMENT.

For mild uremia:

1. Diet as for mild acute nephritis.

2. Eliminative measures.

(a) Purgation.

(b) Sweating.

(c) Water if there is little or no edema.

(d) Saline diuretics.

3. Cardiac stimulation is essential if there is any insufficiency.

Severe uremia:

1. Diet should be much restricted in quantity and quality as for severe acute nephritis. Vomiting or unconsciousness may prevent feeding for a time.

2. Water should be administered freely unless there be much edema. If water cannot be taken by mouth it can be used as salt-solution by:

(1) Hypodermoclysis.

(2) Intravenously.

(3) By rectum, (a) Enema.

(b) Seepage.

3. Purgation. Magnesium sulphate, or other purgatives (p. 283) may be used. Croton oil is useful especially for unconscious patients. If rubbed up with a little butter, made into a ball and placed on the back of the tongue, it will be swallowed. Repeated doses of purgatives should be employed, if needed, to obtain prompt and profuse watery catharsis, but when there is no edema, excessive purgation may tend to concentrate toxins, and may thus do harm, unless counteracted by free administration of water.

4. Sweating seems in many cases to promote diuresis and to reduce toxemic symptoms. Unless the patient is edematous, fluid withdrawn should be replaced by fluid ingested lest toxic substances become concentrated in the blood. Hot-air baths may be used daily if they cause profuse sweating. They should not be ordered for an unconscious patient. Pilocarpine should not be used if there is pulmonary edema, cardiac insufficiency or unconsciousness.

5. Venesection. A pint or more of blood may be withdrawn from a vein at the elbow by incision, or, if a suitable apparatus be at hand, by aspiration.

Opinion is divided as to the need or value of injecting salt solution after bleeding. Ordinarily, patients do well without it.

6. Colon irrigations with large quantities of hot water may be tried in the hope of promoting elimination of toxins.

7. Drugs. The use of nitroglycerin or other vaso-dilators is followed frequently by pronounced diuresis in patients having hypertension. The effect is transient.

Morphine may be given subcutaneously for convulsions.

Saline diuretics, e.g., "Cream of tartar water,"* Pot. citrate, or "Basham's mixture," may be of use when the severe symptoms have subsided.

Heart stimulants are required when there is any cardiac insufficiency, p. 19.

* A sat. sol. of Pot. bitartrate, the strength of which is 1 in 201, equal to about 40 grs. in a pint, or to 3 gm. in 500 c.c. of water. Lemon juice or lemon peel can be used for flavoring.

CHAPTER III.

ACUTE INFECTIOUS DISEASES.

PRINCIPLES OF TREATMENT FOR INFECTIOUS DISEASES.

1. Rest in bed
 - a.* To conserve strength.
 - b.* To reduce metabolic waste.
2. Ingestion of much water
 - a.* To dilute toxins.
 - b.* To favor their elimination.
3. Bowels should be kept clear
 - a.* To favor digestion.
 - b.* To prevent absorption of toxic substances.
4. Good nursing
 - a.* To secure cleanliness.
 - b.* To conserve strength.
 - c.* To promote comfort.
 - d.* To afford accurate information to physician.
 - e.* To facilitate treatment.
5. Diet should be
 - a.* Easy to swallow.
 - b.* Easily digestible.
 - c.* Nutritious but not bulky.
 - d.* Palatable and varied.
6. Meals should be
 - a.* Frequent and small to favor digestion.
 - b.* Commensurate in quantity with digestive power.
7. The sick-room should be well ventilated.
8. Infection of others must be prevented.
9. Symptoms should be treated as they arise with regard to the circumstances of the case.

TYPHOID FEVER.

Notes.—Typhoid is characterized pathologically by peculiar ulceration of the small intestines. Ulceration is less frequent in the colon and is rare in the rectum.

Typhoid bacilli enter the blood, the organs, the secretions, and the excretions.

The disease is self-limited, lasting from two weeks to three months. Relapses are common and complications frequent. Toxemia is often severe.

PROPHYLAXIS.

Inoculation with typhoid vaccine (p.299) should be required for all hospital nurses or others who may have the care of enteric cases.

Inoculation should be advised for travellers and others who cannot be certain of the purity of water, milk, etc., which they may consume.

COMMON CAUSES OF DEATH.

1. Toxemia.
2. Exhaustion.
3. Severe complications.
 - (a) Perforative peritonitis.
 - (b) Repeated hemorrhages.

PRINCIPLES OF TREATMENT FOR TYPHOID.

- A. Prevent infection of others.
- B. Dilute toxins and favor their elimination.
- C. Conserve strength of the patient.
- D. Diet should be suited to the individual as well as to the disease.
- E. Drugs are to be prescribed for definite reasons only and not to reduce the fever.
- F. Observe the patient's condition closely and modify treatment promptly when indicated.
- G. Have the best nursing available and if possible have a day-nurse and a night-nurse.
- H. Treat symptoms and complications with due regard to other circumstances of the case.

METHODS OF TREATMENT FOR TYPHOID.

- A. "Enteric precautions."
 1. Isolation of the patient is desirable.
 2. Flies must be excluded.
 3. Those who touch the patient should wash their hands promptly.

4. Eating utensils should be reserved exclusively for the patient and washed and kept apart.

5. Sheets and other linen when removed from the sick room should be soaked in 5 per cent carbolic acid for at least half an hour, or boiled.

6. The best method of dealing with feces * is that of Kaiser.

"It consists of adding enough hot water to cover the stool in the receptacle and then adding about $\frac{1}{4}$ of the entire bulk of quicklime (calcium oxide), covering the receptacle and allowing it to stand for two hours."

Urine can be treated similarly by adding enough quicklime to bring it to a boil.

7. Bath water may be boiled after using when practicable, but this is not worth while where plumbing is good.

8. Cleanliness of the attendant is essential.

B. Dilution and Elimination of Toxins.

1. The urinary output should be kept above 60 oz. (nearly two litres) in 24 hours by free administration of water. A much larger quantity of urine can be obtained but it is a question whether water taken in very large quantities may not favor hemorrhage. Liquids, including liquid foods, should total about three quarts daily.

2. The bowels should be kept clear. If they do not move freely suds enemata may be employed as often as necessary. Cathartics are to be avoided as a rule during the ulcerative stage because excessive peristalsis may favor hemorrhage or perforation.

C. Conservation of Strength. Very important because of the long average duration of typhoid.

1. The nurse should feed the patient, turn him over, allow him to do nothing for himself and should make him comfortable.

2. The maximum of nutrition should be maintained by frequent feedings.

3. Visitors should be excluded entirely as a rule.

D. Diet. Dr. Shattuck's principle in choosing a diet has been stated by him as follows: "Feed with reference to digestive power

* H. Linenthal: Monthly Bul. Mass. State Board of Health, Jan., 1914.

rather than name of disease, avoiding such articles of diet as might irritate ulcerated surfaces."

Requirements.

1. Nutritious but not bulky.
2. Easily digestible.
3. Non-irritating to intestine.
4. Quantity commensurate to digestive power.
5. Adapted to the patient's condition.
6. Palatable and varied.

Meals should be frequent, at least once in four hours. If the patient can take little at a time he should be fed every two hours or even every hour.

Diet List. An enteric diet may include the following foods and any others that conform to the requirements stated above: liquid foods, strained cereals, custard, blancmange, junket, simple ice cream, soaked toast without the crust, bread or crackers in milk, soft eggs, oysters without the heel, finely minced chicken, etc.

Coleman has shown that, by the free use of milk-sugar and of cream, loss of weight in typhoid may sometimes be prevented. The cream can be added to milk or to other foods. Milk-sugar can be added to liquids, in the proportion of $\frac{1}{2}$ oz. in 4 oz. (or 15 in 120 mils of liquid. Coleman's diet, if used indiscriminately, may perhaps cause death.

Departure from routine diet may be required for various reasons, e.g.

1. Patient too weak to swallow solid food.
2. Vomiting.
3. Persistent diarrhea, often due to milk.
4. Severe distension, often due to milk.

Advantages of a liberal diet.

1. Weight and strength are better maintained.
2. Toxemia is less.
3. Distension is uncommon.
4. Convalescence is shorter.
5. Patients suffer less.

E. Medication. Hexamethylenamine (p. 289) should be prescribed by routine as a urinary antiseptic. It may, rarely, cause

hematuria or painful micturition. It should then be omitted for a few days and resumed in smaller dosage.

Other drugs may be ordered occasionally for special symptoms as required.

Antipyretics should not be prescribed to reduce fever, but they may be used for headache, in the early stages of typhoid. Being depressants they are dangerous when the circulation is impaired.

F. Observation.

I. Examine the patient once or more daily during the febrile stage. Look for:

1. Signs of circulatory weakness.
2. Pulmonary hypostasis.
3. Bed sores.
4. Changes in the condition of the abdomen.
 - (a) Distension of abdomen.
 - (b) Spasm.
 - (c) Tenderness.
 - (d) Distension of bladder from retention.

II. Keep track of:

1. Urinary excretion.
2. Nourishment.
3. Account for changes in pulse or temperature. They may be the first sign of hemorrhage or perforation.
4. Keep sterile salt-solution ready for use by hypodermoclysis or intravenously in case of need.

III. It is the duty of the physician carefully to supervise treatment during the period when hemorrhage or perforation may occur, and he himself or his assistant should be accessible at times when emergencies may arise.

G. Nursing.

The nurse's general duties are to do her utmost to spare the patient exertion, discomfort and mental unrest; to report to the physician at his visit all changes in the condition of the patient; to be prepared to answer questions as to the effect of treatment prescribed; and to notify the physician at once of alarming symptoms or signs suggesting severe hemorrhage or perforation. She should know the possible significance of sudden changes in pulse-

rate and temperature and should look for blood in every fecal dejection. To prevent accident she should, as far as possible, avoid leaving the patient alone even when he is not apparently delirious.

The following complications can generally be prevented by an experienced nurse:—

1. Bed sores.
 2. Corneal ulceration.
 3. Middle-ear infection.
 4. Parotitis.
 5. Boils.
 6. Cracked lips.
 7. Tender toes.
 8. Hypostatic congestion.
1. To prevent bed sores:—
- (a) Keep sheets smooth, clean and dry.
 - (b) After soiling, clean the skin promptly, dry it, rub in zinc oxide ointment, and powder with starch.
 - (c) Change the patient's position occasionally.
 - (d) Do not allow prolonged pressure on bony prominences.
 - (e) If a red spot appears where there has been pressure keep pressure off that part by rings or pads and paint the spot with picric acid, 1 per cent.
2. To prevent corneal ulceration keep cornea clean by bathing the eyes every four hours with a 2 per cent watery solution of boric acid.
- 3-4. Middle-ear infection or parotitis may result from improper care of the mouth. The mouth should be cleaned and the throat sprayed every four hours with a non-irritating antiseptic. Dobell's solution, or "alkaline antiseptic" will serve, diluted, if necessary, with one or two parts of water to avoid irritation of the mucous membranes. Excessive dryness of the tongue from mouth breathing can be prevented by the use of vaseline.
5. Boils in crops are generally due to the use of dirty sponges. If a boil appears care must be taken to avoid spreading the infection.
6. Cracked lips can be prevented by the use of cold cream.
7. To prevent "tender toes" keep weight of bed-clothing off of feet.
8. Hypostatic congestion of the bases of the lungs is due in part to protracted lying in one position. It can be combated, if not prevented, by rolling the patient on one side and supporting

him in this position for an hour or more by means of a pillow. The patient should then be rolled onto the other side for another period of time, and these manœuvres should be practiced at least once daily.

ROUTINE ORDERS TO NURSE.

1. Enteric precautions.
2. Dr. Shattuck's enteric diet. (Prof. F. C. Shattuck.)
3. Baths as directed every four hours, *p.r.n.*
4. Suds enema every other day or *p.r.n.*
5. Spray throat and wash mouth and eyes every four hours.
6. Hexamethylenamine, 5 grs. (or 0.3 gm.) *t.i.d.*
7. Record temperature, pulse and respiration every four hours, the daily excretion of urine, and the amount of food and water ingested.

Specific directions for diet and baths should be given with due regard for the circumstances of each case. Frequent modification may be required.

H. Convalescence. In convalescence free evacuation of the bowels is important.

Massage may hasten return of strength.

SYMPTOMATIC TREATMENT FOR TYPHOID.

Fever and Toxemia

Hydrotherapy generally acts well.

Benefits expected from it are:

1. Fall of temperature of from 1 to 2 degrees.
2. Fall in rate with increase of force and volume of the pulse.
3. Deeper breathing and diminution of pulmonary hypostasis.
4. Better sleep.
5. Diminution of symptoms of toxemia.

Rules for use of baths.

1. Baths should be ordered for definite indications only.
2. For children and for thin and feeble patients, baths should be warmer and shorter than for the robust adult.
3. The physician should supervise the first bath and prescribe subsequent baths with regard to the effect of the first one.
4. If the pulse gets weaker the bath should be stopped.

5. Much cyanosis or shivering after the bath indicates that it was too cold, or too long, or that not enough friction was used.

6. Stimulants are seldom required before or after a bath that is suited to the case and well given.

7. Baths must be modified or omitted if they greatly excite the patient, interfere with sleep, or cause a rise of temperature.

Routine bath order. For temperature * of 103.5° rectal give bath every four hours at 85° . For every half degree of temperature above 103.5° lower temperature of bath-water 5° .

Methods of bathing. "M. G. H. Typhoid Bath." With rubber sheet, supported at edges by rolls of blanket make tub in bed of patient. Dash water over him, and rub vigorously in turn, with the hands, the chest, limbs, and back, but not the abdomen. The duration of the bath should be 20 minutes or less if so ordered.

Sponge baths often act well and are preferred in many cases. A mixture of equal parts of alcohol and 2 per cent boric acid solution in water at the required temperature can be used for bathing.

Circulatory Disorders.

Indications for stimulation are tachycardia of 120 or over, or weakness, inequality, or irregularity of the pulse, see Circulatory Disorders of Fevers and Sepsis, p. 35.

For treatment of circulatory disorders see same section. Symptoms generally develop gradually giving time to prescribe. Saline infusions give excellent results in suitable cases.

Diarrhea.

Severe diarrheas are dangerous and must be checked.

1. Examine stools to determine if they contain undigested food. If so, omit that kind of food or reduce the amount. Curds from milk may be found.
2. Treatment as for simple diarrhea, p. 225.

Constipation.

Constipation is a frequent cause of fever in convalescence.

* Temperatures in typhoid are best taken by rectum because these are more reliable than mouth temperatures. The rectal temperature averages about 1° higher than the mouth temperature.

Calomel or Fl. Ex. of Cascara Sagrada, Castor-oil or "Russian oil" (p. 297) may be given at this stage. Neglect of the bowels may result in fecal impaction.

Distension.

1. If stools show curds reduce or omit milk.
2. Turpentine stupes * may give relief and can be used *p.r.n.*
3. Rectal tube may be tried.

Vomiting.

Reduction or modification of diet is advisable for a time at least. Swallowing small pieces of cracked ice, or a teaspoonful of shaved ice with brandy may relieve.

Headache.

If not relieved by an ice-cap placed on the forehead, phenacetin fr. 5 to 10 grs. (or 0.3 to 0.6 gm.), with caffeine citrate 1 gr. (or 0.065 gm.), or some other analgesic may be prescribed.

COMPLICATIONS OF TYPHOID.

I. HEMORRHAGE FROM THE BOWEL.

Signs. First sign of small hemorrhage is blood in the stool. First sign of large hemorrhage may be a rapid fall in temperature and a rise in the pulse rate.

Treatment. 1. Omit nourishment, water, and baths.
 2. Give nothing but cracked ice by mouth for 24 hours.
 3. Give morphine subcutaneously — repeat dose in 15 minutes or half an hour and repeat again at half-hour intervals until the respiration becomes slower. Do not let the respiration fall below 10 per minute. When it has reached 15 or less give morphine in small dosage, if at all, lest poisoning result.

The object of using morphine is to stop peristalsis and to keep the patient quiet until the hemorrhage has ceased.

4. If the patient be exsanguinated raise the foot of the bed to prevent death from syncope but do not stimulate unless there is imminent danger, because increase of blood-pressure may prolong the hemorrhage.

* See textbook on nursing.

The best circulatory stimulants for this condition are a saline infusion or a direct transfusion of blood.

5. For small hemorrhages narcotization with morphine may not be required.

6. Patients who are very weak or emaciated should be fed in spite of hemorrhage.

II. PERFORATION.

Treatment. Surgical. Early diagnosis and prompt operation are essential to success. When the condition of the abdomen has been watched closely before the appearance of the symptoms of perforation the diagnosis will be easier. Spontaneous recovery is extremely rare.

RHEUMATIC FEVER.

Note.—The disease, when typical, is characterized by a migratory articular and peri-articular inflammation with pyrexia and leucocytosis. When untreated the inflammation generally lasts about six weeks. Relapses are common and endocarditis is frequent. Pericarditis or myocarditis is seen occasionally.

There is reason to believe that rheumatic fever is a form of infectious arthritis. Perhaps most of the cases are due to a specific organism.

PRINCIPLES OF TREATMENT.

1. Rest in bed.
2. Relieve pain.
3. Dilute and eliminate toxins.
4. Prescribe large quantities of salicylate and of alkali.
5. Prevent recurrence.
6. Watch for cardiac complications.

METHODS.

1. Relieve pain by protecting the joints with cotton and bandages or by splints. For psychic effect oil of gaultheria may be rubbed on the skin before bandaging. Fomentations may be useful to relieve pain and a hot tub bath when pain and fever permit gives much relief. If the pain be severe and not controlled by other means use morphine hypodermically until the salicylate has had time to act.

2. Dilution and elimination of toxins can be promoted by the free administration of water. Three quarts or more should be ingested in twenty-four hours unless the heart be weak. Cardiac complications may require limitation of liquids.

The bowels should be kept clear. Cathartics may be prescribed as needed.

3. Food should be nutritious and as abundant as can be digested because wasting is often rapid and anemia may develop.

4. **Medication.** Sodium salicylate (p. 287) or some other salicyl compound should be prescribed in large dosage. The quantity should be proportional to the degree of pain and acuteness of the inflammation. For severe cases 10 grs. (or 0.65 gm.) may be ordered every hour until the patient is relieved or toxic. To avoid irritation of the stomach every dose should be given with a full glass of water. Large doses of sodium bicarbonate seem to diminish the toxic effects of salicylates. Twenty grains or more of soda may be ordered with every dose of salicylate. Enough soda should be taken to render the urine alkaline.

Salicin is a good substitute for sodium salicylate and seems to cause less gastric disturbance. Aspirin, or oil of gaultheria, may be tried.

When symptoms have been relieved the dose of the drug can be reduced. It should be continued for a month or more after the patient is apparently well.

When salicylates act well, in from twenty-four to forty-eight hours, a fall of temperature occurs, and with it there comes diminution of joint swelling and marked relief from pain.

The common symptoms of salicylate poisoning are nausea or vomiting, tinnitus, headache and occasionally erythema or delirium. When these occur the drug must be omitted until they subside. It may then be resumed in smaller dosage or in different form.

5. **Recurrence** of arthritis is common early or late.

Early recurrence can generally be avoided by keeping the patient in bed for a week after the inflammation has entirely subsided and by continuing the use of sodium salicylate, 30 to 40 grs. (or 2 to 3 gm.) daily, for one month or more after convalescence. Exercise should be resumed gradually.

Late recurrence and future cardiac disease can often be prevented by eliminating all foci of suppuration. Inflammation of the tonsils or genital tract, sinus infection and pyorrhea alveolaris should be looked for. Tonsillectomy may reveal deep suppuration not demonstrable externally. Tonsillectomy * should be insisted on if the tonsils are a likely source for future infection. Pyorrhea can be benefited by rubbing the gums daily with a 1% solution of potassium permanganate and by rinsing or sponging the mouth frequently with hydrogen peroxide.

6. **Cardiac complications** may be latent or severe. Circulatory weakness may require limitation of liquids.

The patient should remain flat in bed for weeks or months after the disappearance of all signs of active cardiac infection, and should avoid exertion of all kinds for several months thereafter to give the heart ample time to hypertrophy or to adjust itself to the changes.

There is reason to believe that salicylates taken in large quantity tend to ward off endocarditis.

For further information on endocarditis, see Chapter I, page 27.

* Dangerous while the tonsils are acutely inflamed.

CHAPTER IV.

ACUTE INFECTIONS MOST COMMON IN
CHILDHOOD.

BY EDWIN H. PLACE, M.D.

SCARLET FEVER.

I. MANNER OF SPREAD.

A. Exit of virus—chiefly from throat and nose or infected ear, and from other lesions of mucous membrane or skin, such as impetigo, boils, sinuses, etc. Probably no escape of virus from sound mucous membrane, nor in urine or feces. None in desquamating skin.

B. Viability of virus—apparently may survive many days and possibly weeks or months. Under ordinary conditions of light and air, probably dies in a few days, and in sunlight in a few hours.

C. Manner of transfer—chiefly by direct contact; also by indirect contact and droplets. Milk, the only known food to spread contagion—no gross changes in infected milk.

D. Point of entry—almost certainly the throat and possibly nose; possibly wounds, and gastro-intestinal system.

E. Persistence of virus—persists for some time, (weeks or months) in lesions of skin or mucous membrane where there is any loss of continuity of epithelial lining. The more active the inflammation of these lesions and the greater the discharge, the more probable is contagiousness. Most contagious period is usually early during the stage of acute throat and nose inflammation but varies directly with the amount of mucous membrane inflammation so that, in some cases, the highest contagiousness is in late convalescence. I have never found a longer contagious period than 5 months.

II. PROPHYLAXIS.

One attack usually gives immunity for life but there are marked exceptions.

A. Immunity.

1. **Natural.** Increases much after 8 years of age and marked after 21 years, considerable during 1st year and lowest from 2 to 6 years of age.

2. **Active.** Claimed by Gabritschusky by means of vaccines of streptococci obtained from scarlet fever cases. Three injections at intervals of 4 days, of doses of from one to ten millions may be used. Value very doubtful.

B. Asepsis. See under diphtheria (p. 131).

C. Isolation — of great value and should be as early as possible. Finding of missed cases in family or neighborhood or school often possible by investigation at the time of the first recognized case. These should be searched for in each recognized case by examination of contacts for evidence of sore throat, sore nose, discharging ears, glands, nephritis, arthritis, endocarditis, desquamation or any sore or discharging lesion. The finding of these signs does not necessarily show that patient has had scarlet fever, but they should be accepted at least as grounds for suspicion and therefore isolation. Isolation should be carried on for four weeks and until there are no abnormal discharges or open sores.

1. **Technic.** Technique of isolation is that of surgical asepsis reversed, *i. e.*, to keep infection in a small zone instead of a small area free from infection. Air currents play no practical part in spreading the disease.

- (a) Avoid infecting clothing of attendants or utensils from careless touching of patients or putting infected hand or things into pockets, etc. Wear gowns.
- (b) Wash hands thoroughly on leaving zone of infection. Do not handle face or uninfected objects until hands are thoroughly cleansed. Be careful of door knobs.
- (c) Boil dishes, utensils, etc., as they leave patient. Do not put down infected dishes, etc., in an uninfected zone.
- (d) Boil clothes or soak them in 5 per cent phenol solution or similar germicidal solution. Be careful not to infect surroundings in removing these objects from the infected zone.
- (e) Use care to prevent discharges from nose, throat, ear, etc., from being spread about sick room. Use soft piece

of paper, towel or cloth and deposit at once in paper bags or burn.

- (f) Do not allow infected objects as thermometer, pencils, stethoscope, books, money, etc., to be taken from infected zone without proper disinfection.
- (g) Thorough cleansing of patient when released from infected zone,— while of questionable importance,— still must be done. The mouth should be thoroughly cleansed and antiseptic sprays may be used in the nose, although value is uncertain. Patients should not be released until all signs of inflammation of mucous membranes have entirely subsided.

D. Quarantine. Exposed persons should not be allowed to go to new places or come in contact with others as in school or social assembly, etc., until 2 weeks after the last exposure. Care should be taken to see that they have not a mild and overlooked infection. Closing of school is unnecessary provided careful study of the pupils is made to eliminate those who are ill or who are carriers. Adults unless dealing in raw foods, especially milk, cream and ice cream need not be quarantined as a rule.

E. Disinfection.— of doubtful value as a general measure of control. Proper cleanliness and asepsis about patient obviates this necessity. In well-lighted and aired rooms, objects that might have been infected have usually ceased to be a source of danger by the time the patient has ceased to harbor the organisms and can be released. Disinfection can be done by exposure to sun, by thorough cleansing and washing with soap and water and germicidal solutions such as phenol or corrosive sublimate or by thorough and prolonged exposure to formaldehyde gas. All things that can be boiled, as linen, etc., should be so treated.

III. TREATMENT.

The great dangers of scarlet fever are sepsis, cardiac involvement, nephritis and toxemia. Of these sepsis is by far the greatest factor in mortality.

A. Toxemia, treatment of:—

1. **Serum treatment.** Convalescent patient's blood serum 50 to 100 cc. should be used intravenously preferably. The convales-

cent's blood may be obtained 1-3 weeks after temperature becomes normal. Testing for syphilis and bacterial contamination should be done before using serum; this treatment is of limited application but has some value. The whole blood of convalescent either citrated or injected as soon as drawn may be used for intramuscular injections.

Antistreptococcus serum obtained from horses. Moser's serum, obtained by injecting horses with many strains of streptococci cultivated from scarlet fever patients, may be used in doses of at least 200 cc. It is of little value in some cases and often disappointing.

2. **Free fluid intake.** $1\frac{1}{2}$ litres daily according to age. If patients do not take fluid freely it may be given by rectum or subcutaneously or in very toxic cases intravenously as salt solution.

3. **Eliminative treatment.** Mild catharsis. Daily warm bath, etc.

4. **Rest in bed.**

B. General Sepsis, treatment of:—

I. Prevention.

(a) **Guarding portals of entry.**

(1) **Local cleansing of mouth, gums, teeth, etc.,** with cotton swab applicator 2 or 3 times daily. Saline solution, soda bicarb. solution, borax solution or a combination of these with 10 or 20 per cent glycerine or other mild cleansing solution may be used such as Dobell's.

(2) **Protection of mucous membranes from trauma, etc.** Albolene and similar petroleum oils are of value following cleansing of mouth, especially in mouth breathers, and where there is mucous membrane infection. Carious teeth, old roots, tartar deposits, etc., should be seen to.

(3) **Antiseptics.** Phenol, eucalyptus, argyrol, silver nitrate, iodine, etc., are of doubtful value. Their use may cause chemical injuries to mucous membrane. If used, careful consideration should be given to the amount of harm they do to tissue as well as to bacteria. The least injurious to tissue are usually best.

(4) **Nasal infection.** Nasal infection and nasal vault infection as well as accessory sinus disease may be sources

of danger but are difficult to treat effectually. Mechanical cleansing by swabs is allowable. Syringing is liable to cause injury, or spread infection. Patient may clear the nose by blowing, if old enough; application of ointment and medicated oils for protection and mild anti-septic action is of value.

(5) **Tonsillectomy.** Removal of tonsils and adenoids as early as possible in the acute stage of infection has been suggested and, in practice, seems to be beneficial. In a limited number of cases in which tonsillectomy has been done in early stage of scarlet fever a very favorable course has followed.

(b) **General Hygiene.**

2. **Treatment.** Same as prevention. Rest in bed, free fluids, baths and alcohol rubs, cocoa butter rubs, ice cap or ice collar, sunshine, fresh air, outdoor treatment. Secure sleep and comfort by alleviating cause of discomfort by any means available. Sleep and rest should not be sacrificed to the use of antiseptics, etc. Supply energy by easily assimilated foods. Sugar is of great value.

C. Local Sepsis, treatment of:—

1. **Throat.** Antiseptics of questionable value. Cleanliness and soothing treatment is principle. Swabbing local lesions carefully with one-half strength hydrogen peroxide, 20 per cent argyrol, iodine preparation, 5 to 50 per cent silver nitrate, or 2 to 4 per cent chromic acid solutions selectively used may be of benefit. Hot irrigations often help. Coughing and struggling when irrigations are given contraindicate their use.

2. **Nose.** Cleansing of nose by the patient blowing is better and safer than irrigations. Sprays are of little value but may be used.

Instillations of 15 per cent argyrol, or camphor, gr. ii, menthol, gr. ii, and iodine, gr. i, in albolene, 1 oz. may be tried. Plain albolene instillation often of value.

Insufflations of calomel powder twice daily are often of value.

3. Otitis Media.

(a) **Prevention.**

(1) Avoid nasal irrigation, palpation of nasal vault for ad-

enoids, coughing, forcible washing of throat, Trendelenberg's position, etc.

(2) Prevent obstruction of nose from acute swelling—by oily instillations or sprays as above. Adrenalin 1 to 8000 in oily preparations (adrenalin inhalant) may sometimes help. Ten drops of 15 per cent argyrol may be instilled into the nostril and allowed to run down into the fossa of Rosenmüller by holding head to that side while in the supine position for 20 minutes.

Note.—Previous abnormalities of nasal vault, such as adenoids, large turbinates, etc., as well as attempts at local asepsis are important factors in causing otitis.

(b) **Treatment.**

- (1) Treatment of nose and nasal pharynx as above.
- (2) Free drainage by cutting drum if bulging. Repeat it as often as necessary.
- (3) Irrigations ev. 2 to 4 hours with boric acid or saline solution at 100 to 110 degrees Fahrenheit.
- (4) The dry treatment may be used instead of irrigations especially when discharge is thin. It consists of frequent sponging out with sterile cotton and keeping in a narrow wick to the drum but not closely filling the canal. Wick must be changed as soon as saturated. To this may be added later boric powder insufflations or instillations of 5 per cent boric acid in 15 per cent alcohol solution. Silver salts and other antiseptics are of questionable value.
- (5) Watch for symptoms of mastoiditis.

4. **Mastoiditis.**

(a) **Prevention.** Watch and promptly treat otitis media.

(b) **Treatment.**

- (1) Prompt drainage of middle ear by paracentesis. Repeat as often as necessary. Copious irrigations every 2 hours—hot. Applications of ice to the mastoid process.
- (2) Operation is indicated if tenderness persists, if edema increases or if temperature remains up for more than 3 days. Operation may be desirable even in the absence of these signs. Continued discharge alone may be an indication.

5. Cervical Adenitis.

(a) **Prevention.**

- (1) Throat and mouth cleanliness, attention to teeth, gums, etc.
- (2) Removal of tonsils and adenoids. Even in an acute stage of the disease removal of the tonsils has given highly favorable results, but further experience is desirable.
- (3) Treatment of diseases of the nose and accessory sinuses.

(b) **Treatment.**

- (1) Ice applications the first few days; poultices afterward. Resolution without pus often occurs with poultices.
- (2) Treat throat, mouth and nose as needed.
- (3) Chemical applications as methyl salicylate, iodine petrogen, ointment of colloidal silver (Credé) are of very doubtful value but may be used.
- (4) Incision if suppuration occurs. Best results obtained by not incising too early, allowing pus to become localized and the induration to subside. Burrowing of pus is rare. If it occurs incise very promptly. Incision should be as short as possible and in lines of cleavage of the skin to avoid scar.

6. Pyemia.

Incisions and drainage as lesions develop.

7. Arthritis.

- (a) **Simple.** (Scarlatinal arthritis and periarthritis.) Self-limited to a few days. Rest. Immobilization by cotton batting bandages or splints. Applications of methyl salicylate dressings, etc.
- (b) **Septic.** Incision as early as diagnosis has been made. Thorough and prolonged washing out of cavity and sewing up tight has given the best result. Incision followed by rubber dam drains has not been so favorable. Immobilization.

8. Phlebitis (rare). Elevation for circulation. Local heat such as poultices. Citric acid internally may be used.

9. **Arterial Thrombosis** (rare). Elevation, local heat, amputation only after line of demarkation has formed.

10. **Empyema.** Drainage by operation.

11. **Peritonitis** (rare). Operation required.

12. Local infections may be benefited by autogenous vaccines.

D. Nephritis.

I. Prevention.

(a) Attempt to reduce toxemia of acute stage. See under toxemia.

(b) **Kidney rest.**

(1) Rest in bed for at least three weeks in all cases.

(2) Avoid excessive loss of heat and continued chilling of skin.

(3) Free fluid intake in the absence of edema probably benefits the kidney.

(4) **Diet.** Low protein, chiefly carbohydrate and fat. Avoid extractives, nucleo-proteids and foods rich in purin. Cream and milk, one to two pints, cereals, especially wheat, rice, baked potatoes, tapioca, sugar, sweet fruits, bread, green vegetables, except asparagus. In the acute stage patient may refuse everything but fluids. Sugar may be used at this time freely.

(5) Daily hot bath.

(6) Salt intake may be reduced but value is uncertain.

Alkalies may be given.

I. Treatment. See Nephritis, page 61.

2. **Uremia.** See page 71.

E. Cardiac complications.

I. Endocarditis.

(a) **Prevention.**

(1) Avoid and promptly treat local infection as alveolar abscess, otitis media, septic joints, diseased tonsils, accessory sinus disease and other focal infections, which may be responsible for infection.

(2) Prevent exertion during the period likely to be attended by cardiac complications.

(3) Reduce Toxemia.

(b) **Treatment.**

(1) Rest to be as complete as possible, prolonged until lesion has entirely healed—2 to 6 mos. Cardiac stimulants are contraindicated because cardiac insufficiency does not develop early. An ice-bag, aconite, or bryonia may perhaps give the heart relative rest by quieting its action.

(2) **Salicylates.** Danger of kidney injury must be kept in mind.

2. **Pericarditis.** The same as endocarditis.

Morphine may be necessary because of pain. Posture may need to be upright also for this reason. Fluid may require aspiration. Pus will require operation and drainage.

F. Fever. Usually self-limited, not prolonged. Alcohol rubs, cold sponges, cold baths, may be used for a stimulant effect. Friction of the skin is usually advisable while using cold treatment. Friction alone using cocoa butter may also reduce temperature, stimulate vaso-motors and add to comfort.

MEASLES.**I. MANNER OF SPREAD.**

A. Exit of virus—from nose and throat and possibly from conjunctiva; none by desquamation.

B. Viability of virus—slight; apparently does not survive under any known natural condition more than one or two days. Usually dies in a few hours especially in light or sunny conditions.

C. Manner of transfer—by droplets and direct contact; at times by indirect contact; none by food.

D. Point of entry—probably respiratory tract, especially nose and throat.

E. Persistence of virus—dies with the establishment of convalescence or earlier; does not persist after subsidence of measles rash without regard to secondary infections such as otitis media. Most contagious period—catarrhal stage.

II. PROPHYLAXIS.

A. Immunity. Practically none naturally except during first year of life especially first 6 mos. Immunity after one attack very great and almost always complete.

B. Asepsis. Particularly difficult in general life because of droplet infection. The most casual contact will allow the disease to be contracted. Avoid the region of persons who sneeze. Keep hands clean and avoid touching mouth or nose with infected hands or infected objects.

C. Isolation — of little general value because of the contagiousness of the disease, and the appearance of contagiousness usually several days before the disease is recognized. Isolation to be of any value should be secured early in the catarrhal stage, and continued until the acute catarrhal stage has subsided, that is, from seven to fifteen days. There are no carriers.

Technic. Patient must be isolated so that droplet infection may not be carried to others, otherwise technic same as for scarlet fever except of much less importance.

D. Quarantine. The one effective means of control. Susceptible exposed persons should be kept from contact with non-immunes until three weeks from the last exposure. The disease cannot be stopped in schools by inspection and requires closing of the schools if it is desired to check the epidemic. Closing of the schools to be of value requires prevention of continued contact of the families of a community.

E. Disinfection — of practically no general value. Measles contagion dies with extreme rapidity and probably invariably within 24 hours after leaving body under ordinary conditions. Surroundings of patients who have recovered have ceased to be infectious.

III. TREATMENT.

The chief cause of death is secondary infection of mucous membranes of which pneumonia is of greatest importance. Treatment, therefore, should be directed against mucous membrane infection, especially of the lungs.

A. Acute toxemia.

1. Free fluid intake.
2. Cathartics must be used carefully to avoid causing diarrhea.
3. Stimulation.
 - (a) Tepid baths or cool sponging.
 - (b) Friction to skin, as cocoa butter rubs, etc.

B. Mucous membrane infections.**1. Bronchopneumonia.**

(a) Prevention.

(1) General resistance. Fresh air, sunshine, rest in bed, and food easy to digest and to absorb help to maintain resistance.

(2) Local resistance. Mouth cleanliness, prevention of nasal and laryngeal obstruction, soothing oily sprays may do good.

(3) Avoidance of contact with other infections as colds, diphtheria, etc.

(b) Treatment. See pneumonia, page 153.

2. Acute laryngitis.

(a) Expectorants of which water is the most essential, syrup ipecac, syrup hydriodic acid, etc.

(b) Steam inhalations with compound tincture of benzoin and menthol, followed by oily sprays.

(c) Intubation if obstruction occurs and requires it.

(d) Antitoxin in all cases unless diphtheria has been excluded by examination of the larynx and taking cultures from the larynx.

(e) Cold applications or ice collar to neck.

3. Tracheitis. Same as laryngitis.**4. Otitis Media.** See scarlet fever, page 107.**5. Rhinitis.**

(a) Soothing applications, oily sprays.

(b) Atropine, camphor, etc., as in rhinitis tablets.

(c) Argyrol sol 10%.-15% instillations or spray.

6. Stomatitis.

(a) Mouth cleanliness.

(b) Hydrogen peroxide if teeth and gums are foul—use once or twice daily.

(c) Chromic acid solution, 2 to 4 per cent: apply with swab once daily.

(d) Removal of carious roots, bad teeth, etc.

(e) Careful avoidance of trauma of any kind. Mouth cleanliness, mild antiseptic solution with cotton swab applicators.

Iodine preparations and silver nitrate may have value in certain selected conditions.

7. Noma.

- (a) Prevention. Careful attention to mucous membranes of the mouth prevents stomatitis. Avoid trauma from teeth or manipulations. Treat all ulcers promptly with peroxide and apply chromic acid solution. Watch for ulceration at edges of gums especially and treat with chromic acid solution or iodine.
- (b) Treatment. Escharotic to destroy completely the infected area; the actual cautery is the best, with chloroform anesthesia.

8. Conjunctivitis.

- (a) Boric acid solution wash three times daily.
- (b) White vaseline for lids.
- (c) Avoid injuring cornea.

9. Enterocolitis.

- (a) Prevention. Avoid overfeeding; be sure that milk and other food is free from contamination or is pasteurized or sterilized. Avoid unwise catharsis. Avoid starvation.
- (b) Treatment. Force fluid, cereal diet, bismuth in drachm doses every four hours. Beta-naphthol may be tried.

PERTUSSIS.

I. MANNER OF SPREAD.

- A. Point of exit — from nose and throat.*
- B. Viability of virus — apparently dies rapidly outside body.*
May survive 1-2 days.
- C. Manner of transfer — chiefly by droplets also by direct contact; rarely by indirect contact.*
- D. Point of entry — Nose or throat.*
- E. Persistence of virus — persists few weeks and possibly as long as characteristic cough. Most contagious period — early catarrhal stage.*

II. PROPHYLAXIS.

A. Immunity.

1. Natural. Extremely low in early life, become greater after five years and considerable in adult life.
2. Active immunity is claimed by means of vaccine. Value is uncertain. One attack usually gives immunity.

B. Asepsis. Similar to that of measles, p. 117.

C. Isolation. Similar to that of measles, p. 117.

D. Quarantine. Similar to that of measles, p. 117.

E. Disinfection. Similar to that of measles, p. 117.

III. TREATMENT.

A. Vaccines still remain of doubtful value, but are worthy of trial. Vaccines containing many strains of the Bordet-Gengou bacillus should be used — dosage of from 100 million to a 1000 million may be used at intervals of from two to five days. Mixed vaccines containing also many of the bacteria commonly infecting mucous membranes are used.

B. Hygienic.

1. Building up general resistance. Fresh air and sunshine. Rest, varying with the amount of prostration or fever.

2. Diet. Easily digested foods such as cereals, milk, bread and butter, rice, simple puddings, chicken, scraped beef, zwiebach, etc. If vomiting occurs, meals should be frequent and small in amount and given if possible after the paroxysm. If a meal is vomited, it should at once be repeated. High protein foods are inadvisable because of the longer stay in the stomach and the danger of loss from vomiting.

3. Bitter tonics, iron, etc., may be given. Avoid medicines which might upset digestion.

C. Local resistance. Avoid dust, irritant gases, etc. Oily sprays as albolene or albolene with other sedatives or antiseptics to nose, throat and larynx may be used. Free water intake is essential. Inhalations of steam with menthol and creosote are sometimes useful to stop the paroxysm, but must not be used at the expense of general hygienic treatment.

D. Sedatives should be used only when demanded for severe cough which exhausts the patient or interferes with sleep and nourishment. Antipyrin 1 to 4 grs. three times a day, or Quinine Sulph. 2 to 5 grs. may be tried, or Tincture of Belladonna, beginning with 1 to 3 min. ev. 4 hours and increasing until the physiological effect appears and then continuing in slightly smaller doses. Chloral may be used in the dose of 2 to 5 grs. once or twice a day. Benzyl benzoate in doses of gr. ii to gr. xx ev. four hours may be used.

E. Paroxysms of cough.

1. Fresh air day and night is, probably, the most efficient means of diminishing cough.
2. Psychic treatment—calm the fear of patient by psychic suggestion and avoid psychic upsets and loud noises.
3. Avoid all irritants.
4. Pressure on the epigastrium or the use of tight bands around the abdomen.
5. Spraying the larynx, with sedative solution such as menthol or by inhalations of steam with benzoin followed by menthol, etc., are of limited value.
6. Sedative drugs: see above.

F. Complications.

i. Bronchopneumonia.

A. Prevention.

- (1) Fresh air and sunshine throughout the disease.
- (2) Rest.
- (3) Keep up nutrition by wise feeding.
- (4) Avoid fatigue from paroxysms.
- (5) Avoid other infections, such as acute colds, irritants, such as dust, etc.
2. **Stomatitis.** See Measles, page 119.
3. **Otitis Media.** See Scarlet Fever, page 107.
4. **Cerebral hemorrhages** may be guarded against by attempting to control severe paroxysms of cough.
5. **Vomiting.** Prevention depends on control of cough. The danger is malnutrition. The effects can be minimized by frequent small meals, and by taking food promptly after vomiting.

VARICELLA.

I. MANNER OF SPREAD.

- A. Exit of virus* — probably only through the varicella lesions of skin and mucous membrane.
- B. Viability of virus* — apparently survives some hours, days, or weeks.
- C. Manner of transfer* — direct and indirect contact.
- D. Point of entry* — probably mucous membrane of throat or nose; possibly gastro-intestinal tract, or wounds.
- E. Persistence of virus* — may persist in lesions until healed.
Most contagious period — vesicular stage.

II. PROPHYLAXIS.

- A. Immunity.* Considerable under six months and increased distinctly after five years, and is rather marked in adult life.
- B. Asepsis.* Difficult to carry on in practice, the disease is so contagious. Principles are similar to scarlet fever and diphtheria.
- C. Isolation* — should be insisted on as early as possible and continued until complete healing of the lesions or until they are entirely dry.
 - i. Technic*, same as for scarlet fever and diphtheria, p. 101.
 - D. Quarantine.* It is important to keep exposed persons from contact with others for three weeks after the last exposure.
 - E. Disinfection.* See Scarlet Fever, p. 103.

III. TREATMENT.

The toxemia of varicella is of slight importance. Nephritis rarely follows the disease. The chief danger is from infection of the skin lesions with other organisms such as the streptococcus, diphtheria bacillus, etc.

- A. Toxemia.* Cold sponging, ice caps, rest in bed, force fluids, during the acute stage of fever.
- B. Local lesions.* Careful asepsis is essential from the beginning. Daily baths with soap and water preferably by shower, drying the skin with clean towels and anointing with boric acid, vaselin or camphorated oil are of value. Underclothes, night

clothes and sheets should be kept scrupulously clean and changed daily. At times it may be advisable to use weak chlorinated baths. Chlorinated soda is especially beneficial for small areas of secondary skin infection and may be followed by application of ammoniated mercurial ointment.

C. Mouth lesions. Occasionally many lesions occur in the mouth which may require very careful asepsis and cleansing.

D. Corneal or conjunctival lesions may occur. Treatment of these lesions should be very prompt and active to avoid blindness.

DIPHTHERIA.

I. MANNER OF SPREAD.

A. Exit of virus — chiefly from throat and nose and infected ear, but also at times from lesions of skin as cuts, scratches, sinuses, etc.

B. Viability of virus — may survive days, weeks or some months, but under ordinary conditions of light and air, dies in a few days. In sunlight dies in a few hours.

C. Manner of transfer — chiefly by direct contact; also by indirect contact and droplets. Milk — the only known food to spread disease. No gross changes in infected milk.

D. Points of entry — chiefly, of course, nose and throat and also larynx and lungs; rarely eye sack, skin of genitals especially in puerperium.

E. Persistence of virus — persists for days, weeks, months, or even years in lesions of mucous membranes, such as enlarged or diseased tonsils. Most contagious period varies with extent of mucous membrane lesions and quantity of discharge.

II. PROPHYLAXIS.

A. Immunity. This can be tested by Schick's test. $\frac{1}{50}$ of the minimum lethal dose of diphtheria toxin freshly diluted is injected intracutaneously into arm. A positive reaction at the end of 48 hours shows a red, infiltrated area of 1 cm. or more in size, the central part of which later becomes pigmented and finally desquamates. The whole duration of the lesion is one or more weeks. Persons having a positive reaction have no antitoxic immunity,

although they may have other immunity. Those showing no reaction at the end of 48 hours are immune. The immunity usually persists indefinitely. False reactions usually occur early and subside quickly. They may cause an error in reading results. Control may be secured by:

- (1) Heat toxin to 75° C. for $\frac{1}{2}$ hour and use as before.
- (2) Repeat and give dose of antitoxin.
- (3) Draw blood and test for antitoxic strength.

Control test with the heated toxin should usually be used, especially in adults.

Readings should be made at 48 and 96 hours.

1. Passive. 1000 to 2000 units of antitoxin, subcutaneously. For immediate need; lasts one to three weeks or more.

2. Active. Toxin and antitoxin mixtures are used. 70 to 85 per cent of the L + dose of toxin mixed with one unit of antitoxin is injected at intervals of one week for three doses. An immunity slowly appears in 1-4 mos. that lasts years.

3. Local. Secure good local conditions of mucous membrane. Remove bad teeth or roots, diseased tonsils and adenoids, etc. Treat diseased gums and mucous membranes and avoid mechanical or chemical injuries to the mucous membranes.

B. Asepsis.

1. Avoid putting fingers, pencils, pins, etc., in the mouth or to the nose.
2. Wash the hands carefully before eating.
3. Do not use common drinking cup or common towel, etc.
4. Avoid kissing on lips.
5. Avoid region of people who cough, sneeze or spit.
6. Avoid milk handled or produced under poor conditions, or by ill persons, and avoid public dining rooms poorly managed.

C. Isolation. Isolation is of great value. Prompt recognition is required to make this effective. Missed cases also must be found by epidemiological studies, and culturing suspects. Isolation should be continued until virulent diphtheria bacilli have been absent as shown by cultures for at least three days.

1. Technic of isolation. See under Scarlet Fever, p. 101.

D. Quarantine. Quarantine is of little practical value as cultures may be taken in exposed persons, and if found to be negative,

quarantine need not be continued. Closing of schools or other places of assembly is unnecessary, but measures should be taken to discover carriers as well as clinical cases among those who thus come together. Schick's test is of great value in finding those who are susceptible to the disease.

III. TREATMENT.

The chief causes of death in diphtheria are toxic action on brain centres in the early deaths, toxic degeneration of the neuromuscular tissues of the heart and of the nerve axis cylinders in the deaths after one week.

In the laryngeal cases, strangulation from mechanical obstruction and, more commonly, bronchopneumonia are the chief causes of death.

The essentials of treatment are therefore early neutralization of toxin with antitoxin and sufficiently prompt relief of laryngeal stenosis by intubation.

A. For Toxemia.

1. Antitoxin.

(a) As early as possible, first day best.

(b) Dose, varying with severity of disease and mode of administration. 2000 for very mild to 100,000 units or more for very severe cases. See antitoxin, page 271.

2. General eliminative measures. See principles of treatment, page 75.

B. For obstruction of breathing.

1. Antitoxin as early as possible.

2. Intubation for obstruction at larynx.

(a) Indications. Stridor, use of accessory muscles of respiration, restlessness, dyspnea. Relief should be secured before cyanosis and exhaustion occur.

3. Tracheotomy.

(a) If intubation fails.

(b) For obstruction above or below the larynx.

4. Bronchoscopy.

(a) For membranous obstruction low down in trachea or bronchi.

C. Local treatment. Of slight value or importance.

1. Cleansing irrigations for the throat. Saline solution, boric

acid solution, or Dobell's solution may be used copiously for cleansing and soothing mucous membranes and should be used as warm as patient can tolerate it. Do not exhaust the patient by excessive attention.

2. Bacteriocidal therapy has failed.

3. Soothing applications for mechanical protection of mucous membranes, such as albolene and oily sprays. The nose may be treated in this way or by instillations. Irrigations should not be used in the nose.

D. Rest. In all cases in which toxemia is marked the patient should be kept in bed for three to six weeks, because cardiac or nerve complications may occur as late as this.

E. Hygiene. Sunshine, fresh air, freedom from dust, etc.

F. Diet. Large amounts of fluid. Balanced diet easily digestible and sufficient for energy requirements. No special dietary indications except digestibility and water content.

IV. TREATMENT OF COMPLICATIONS.

I. Cardiac. Occurs chiefly in the first three weeks of the disease.

(a) **Prevention.** Solely by early antitoxin in sufficient amount.

(b) **Treatment.**

(1) Horizontal position. Do not allow the head or body to be raised.

(2) Nothing by mouth if nausea or vomiting is present.

(3) Nutrient enemata and salt solution or glucose solutions 5-10% by rectum as required by thirst.

(4) Morphine subcutaneously in small doses for sedative effect.

(5) Stimulation of doubtful value. Caffeine sodium salicylate grains one to five ev. 4 hours, subcutaneously.

Note.—The essential of treatment is to secure the highest degree of rest and avoidance of strain on the heart. The disturbance is self-limited, rarely lasting more than one week. If the demand on the cardiac function is kept to a minimum for this period, recovery may occur. Myocardial weakness may occur

late in disease and require careful rest but it is of small importance compared to the early acute cardiac deficiency.

2. Diphtheritic Paralysis.

(a) **Prevention.** Solely by early administration of anti-toxin in sufficient amounts.

(b) **Treatment.**

(1) Improve circulation locally by massage, electricity and passive motion.

(2) Improve general condition. Fresh air, sunshine, food, iron and tonics.

(3) Antitoxin is of no value after the paralysis appears.

3. Otitis Media. See under Scarlet Fever, page 107.

4. Pneumonia. See under Pneumonia, page 153.

5. Chronic "tubes"; chronic obstruction of larynx after intubation.

(a) **Prevention.**

(1) Avoid trauma in operation.

(2) Correct size tubes to avoid undue pressure.

(3) Shortest reasonable duration of wearing tube.

(b) **Treatment.**

(1) Tracheotomy to avoid laryngeal irritation or injury if obstruction persists four weeks without improvement.

(2) After healing of larynx mechanical dilatation by means of tubes or dilators.

6. Cervical Adenitis. See under Scarlet Fever, p. 111.

7. Serum Disease.

(a) **Urticaria.** Local and general sedatives, and mild cathartics and free fluid intake. Adrenalin 1 to 1000 solution, minims, 10 to 15 subcut. Repeat in 20 minutes if necessary.

(b) **Angio-neurotic edema.** Treatment unnecessary and ineffective.

(c) **Erythema multiforme.** No treatment effective.

(d) **Enlargement of lymph-nodes.** Apply ice.

(e) **Arthralgia.** Immobilize, gaultheria dressings, salicylates.

(f) **Arthus' phenomenon,** a local cellulitis at point of injection of antitoxin. Poultices.

(g) **Vomiting.** Stop everything by mouth for a time.

(h) **Anaphylactic shock.**

(I) Prevention.

- (a) Skin test. Scratch skin and apply a little serum. Local reaction of urticarial type in 2 to 15 minutes shows susceptibility. In this case, antitoxin cannot safely be given without special precautions.
- (b) If sensitized to horse serum bovine serum may be used, but sensitization to this should also be tested.
- (c) If patient is sensitized, desensitization may be tried.
- (1) Small doses starting with $\frac{1}{100}$ cc. to $\frac{1}{1000}$ cc., and increase the dose carefully at about $\frac{1}{2}$ hour intervals.
- (d) Paralyze mechanism of shock, *i.e.*, bronchiole spasm.
- (1) Atropine in full dose subcutaneously, 1 half hour before serum.
- (2) Adrenalin in full dose at the same time as serum.
- (2) Treatment. Usually death is too rapid to allow of treatment being used.
- (a) Atropine, full doses.
- (b) Adrenalin, full doses.
- (c) Oxygen.
- (d) Heat.

V. CARRIERS.

1. Remove mucous membrane abnormalities, if possible. Enlarged tonsils and adenoids, foreign bodies, accessory sinus disease, carious teeth, etc.
2. Chemical applications have been of very doubtful value—silver nitrate, as well as argyrol, acetic acid, chromic acid, iodine, dichloramin T, etc., have been used.
3. “Overriding,” by spraying with other bacteria, such as the staphylococcus and bacillus bulgaricus has not proved of definite value.
4. Powdered kaolin applications at short intervals has not proved its value.
5. Vaccine treatment is still of questionable value.

CHAPTER V.

ACUTE INFECTIONS OF RESPIRATORY TRACT.

LOBAR PNEUMONIA.

Notes.—An acute infectious disease of multiple etiology, most commonly caused by the pneumococcus. The rate of the pulse and respiration are indices of toxemia.

Mortality commonly due to:

- | | |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Toxemia

less often to
2. Complications. | <div style="display: inline-block; vertical-align: middle;"> $\left\{ \begin{array}{l} (a) \text{ Circulatory disturbance.} \\ (b) \text{ Asphyxia.} \\ (a) \text{ Empyema.} \\ (b) \text{ Pericarditis.} \\ (c) \text{ Endocarditis.} \end{array} \right.$ </div> |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

PRINCIPLES OF TREATMENT.

Secure good nursing and fresh air.

Eliminate and dilute toxins.

Watch circulation.

Stimulate promptly when required.

Prescribe drugs only for definite reasons.

Take precaution to prevent accident.

Diet suitable to case.

Recognize complications promptly.

Use serum for cases of Type I, p. 145.

METHODS.

1. Eliminate toxins by requiring copious ingestion of water, unless the heart be weak, and keep the bowels clear. Watch urinary output to see that the water is being excreted.

2. Out-of-door treatment is likely to benefit robust patients, but the old and feeble are likely to do better indoors. Fresh air is, perhaps, the best stimulant in pneumonia. Sometimes it diminishes dyspnoea and promotes comfort.

3. Note the outlines and sounds of the heart and the quality of the pulse at every visit.

4. Stimulation is indicated (a) if the quality of the pulse be poor, (b) if it becomes irregular or (c) if the rate go above 120.

Irregularity early in the illness is less apt to herald danger than that developing late. (See Circulatory Disorders of Infectious Fevers and Sepsis, p. 35.)

5. Dyspnoea with cyanosis can be relieved to some extent by inhalation of oxygen passed through absolute alcohol. It should be administered with an apparatus for inhalation and not simply through a tube.

6. Venesection may be very beneficial, particularly when cyanosis and cardiac embarrassment develop early.

7. Morphine is *indicated* to relieve pleuritic pain when a tight swathe fails to do so. Sleep is very important to conserve the strength of the patient and morphine may be used to obtain it, especially in the *early stages* of pneumonia.

Morphine is *contraindicated* whenever bronchial secretion is profuse, because it checks expectoration, and if morphine is to be used in the *later stages* *caution* is necessary.

8. Diet should consist of food that requires no chewing and that is easily swallowed; *i.e.*, liquids, and soft solids.

The amount should be gauged by the digestive power of the individual, but the usual course of the disease is so short that nutrition is seldom important.

Avoid renal irritants and gas-producing foods.

9. Besides the complications above mentioned look out for a true nephritis.

10. When temperature is very high and the heart doing well, sponge baths may be used to reduce the fever.

11. Tympanites may require treatment. An enema of 1 oz. (or 30 mils.) of glycerin undiluted generally acts well.

12. Delirium:

(a) Push eliminative measures to reduce toxemia.

(b) If the patient is emaciated, try to improve his nutrition.

Alcohol by mouth may be beneficial for the delirium of exhaustion.

(c) As a palliative for active delirium, which taxes the patient's strength, morphine gr. 1/6 (or 0.01080 gm.) or, if this fails, morphine gr. 1/8 (or 0.00810 gm.) and scopolamine gr. 1/100 (or 0.00065 gm.) may be used

subcutaneously. Hypnotics may be tried cautiously but circulatory depressants must be avoided.

Caution. Delirium, even when slight, may be dangerous.

When the nurse leaves the room even for a moment some one should take her place lest the patient jump from the window. No razor or weapon of any kind should be left within reach of the patient.

SERUM THERAPY OF PNEUMONIA.

BY HENRY M. THOMAS, JR., M.D.

Note.—Working at the Hospital of the Rockefeller Institute, Cole and his collaborators developed an efficient horse serum for the treatment of pneumonia caused by Type I pneumococcus and established its value in shortening the course of the disease and greatly reducing its mortality.

The methods recommended by these workers for the administration of serum have proved entirely satisfactory in the hands of a great many clinicians and form the basis for the following directions.

It must be thoroughly understood that serum treatment of pneumonia is, to date, limited to those cases in which the disease is caused by Type I Pneumococcus; cases in which the etiologic organism is Pneumococcus Type II, III, IV or Streptococcus or some other organism have given no evidence of benefit derived from any serum therapy. Satisfactory Type I antipneumococcus horse serum is now prepared by the New York Board of Health, Massachusetts Board of Health and several commercial firms from which it may easily be procured. The causative organism of the disease should be determined with the greatest possible haste as the success and relative efficiency of serum treatment depends, in a large measure, on the promptness with which the serum is administered. To this end specimens of lung sputum, urine, and, when possible, a blood culture may be submitted to a bacteriological laboratory from which a report can be obtained in from six to twenty-four hours. If the presence of Pneumococcus Type I is established, treatment should be begun immediately.

METHODS

A. DETERMINATION OF POSSIBLE SENSITIVENESS TO HORSE SERUM.

Skin Test—inject 0.02 mils. of a 1/10 solution of horse serum in normal salt solution intradermally on the dorsum of the forearm sterilizing the skin lightly with 70% alcohol. 0.02 mil normal salt solution intradermally 3 inches above serves as a control. No reaction or merely slight erythema around the injection at the end of 30–60 minutes indicates absence of sensitiveness to horse serum. A positive skin test as evidenced by an urticarial wheal at the site of the injection of horse serum, surrounded by a zone of erythema necessitates careful desensitization. This may be done as follows:

B. DESENSITIZATION OF PATIENT SHOWING A POSITIVE SKIN TEST.

Starting with an extremely small subcutaneous dose (0.025 mil.) of horse serum the amount is given at $\frac{1}{2}$ hour intervals doubling the size of the dose at each injection until the dose reaches 1 mil. (The injection of the small amounts used in the first doses is facilitated by the preparation of a 1/10 solution of horse serum in normal salt solution.) Subsequent doses may be given intravenously starting with 0.1 mil. and doubling the amount at each $\frac{1}{2}$ hourly injection. If symptoms of a general anaphylactic reaction appear these should be controlled by the administration of adrenalin hypodermically and after they have completely subsided a dose similar to that producing the reaction should be given and the gradual increasing of the amount again proceeded with. When 25 mils. of serum have been given in these small doses, after a lapse of 4 hours, 50 mils. may be given followed by the regular dose 6–8 hours later. This procedure is rarely necessary — something less than 2% of the patients requiring it.

C. ROUTINE DESENSITIZING DOSE IN PATIENTS WHO SHOW A NEGATIVE SKIN TEST.

Method: Inject subcutaneously 1 mil. of horse serum, thus minimizing any serum reaction which may occur in patients who have shown negative skin tests. After 1 hour proceed.

D. ADMINISTRATION OF TYPE I ANTIPNEUMOCOCCUS SERUM.

Only persons familiar with the technic of intravenous medication should perform this step. The serum, which is usually put up in bottles containing 100 mils. may be transferred into a sterile intravenous set such as is used for the administration of arsphenamine or may be aspirated directly from the bottle by means of a rubber tube, and 20 mils. syringe and injected into the vein with the use of a three-way stop cock. Care should be taken not to inject the sediment, which always settles to the bottom of the bottle, as this may add to the severity of the reaction. The serum, which is kept in a refrigerator to maintain its potency, is heated to body temperature by emersing the bottle in hot water just before administering it.

Any anaphylactic reaction which may occur will make itself evident by the end of 10-20 minutes. For this reason a small amount (10-15 mils.) should be injected slowly during the first 15-20 minutes so that the treatment may be temporarily interrupted at the first appearance of symptoms. If the patient shows no evidence of a reaction such as increased pulse rate, difficulty in breathing, flushing of the face and chest, sensation of compression over the chest, sneezing, cyanosis, sweating, marked anxiety, urticaria, or edema of the eye-lids or lips, the remaining 80 or 90 mils. may be more quickly injected in 15-20 minutes. If, on the other hand, one or more of these symptoms occurs the injection should be discontinued for 10-20 minutes until they have subsided, when the treatment may be completed. Should the reaction become more severe rather than quickly clearing up, the injection had better be suspended for an hour or two and steps taken to check the symptoms. This is best accomplished by hypodermic doses of adrenalin (0.5 mil. to 0.7 mil. of 1:1000 sol.) or atropine sulphate (0.5 mg.) or both.

E. NUMBER AND FREQUENCY OF TREATMENTS.

In an adult 100 mils. of serum should be given every eight hours until the rectal temperature has fallen and remains below 102° F. Children may require relatively smaller doses. Following the first drop in temperature a subsequent rise should be watched for

and if it occurs without complications to account for it, further serum treatment should be employed. In cases treated on the second or third day of the disease, one to three injections usually suffice. Where the treatment is begun later than the third day as many as five or six injections are occasionally required. No success is to be expected from intravenous treatment of cases suffering from complications such as otitis media, meningitis or empyema. Direct application of the serum to the affected area may, in some instances, lead to improvement.

F. SERUM REACTIONS.

I. Anaphylactic Reactions.

The common symptoms encountered in this form of reaction have been enumerated under Section III.—They occur very shortly after the intravenous administration of serum and rarely if ever occur later than 30 minutes after the treatment is begun. If disregarded and nothing done to avoid or prevent it, this reaction may easily prove fatal.—If care is taken as outlined above to determine the question of sensitiveness and to desensitize the patient according to the individual necessity, and if the first dose is administered slowly, no untoward effects should ever be encountered. Obviously, it is exceedingly important to avoid any severe anaphylactic reaction in a patient already heavily taxed by a serious infection.

II. Thermal Reaction.

Twenty minutes to one hour after the injection of serum a more or less violent chill associated with cyanosis and slight difficulty in breathing may occur. It lasts usually about 20–30 minutes and needs little treatment other than the usual care of patients having a chill. The temperature rises 1–3 degrees during the chill and frequently falls to normal after it, where it may remain or may climb again to its original height. Little or no importance is attached to this phenomenon and no adequate explanation of its occurrence following one injection and not following an identical preceding or subsequent one has been advanced.

III. Serum Disease.

In a large majority of cases receiving serum certain symptoms make themselves apparent 7-14 days after the last dose of serum. These symptoms occurring singly or in varying combinations have become known as serum sickness. They consist in fever (elevation of 1-5 degrees) skin eruption (urticaria or erythema which may simulate scarlet fever or rubella or rubeola), local edema of the skin, headache, bone-ache, enlargement of the lymph glands and transient albuminuria. Of these symptoms the ones most commonly encountered and also the most annoying to the patient are the urticaria and the bone-aches.

The urticaria may be temporarily relieved by local applications of calomine lotion or 95% alcohol gently daubed on. Adrenalin in hypodermic doses of 0.6-1 mil. causes the eruption to disappear and gives relief from the itching for a period of several hours. The urticaria may last for a few hours or for several days.

The headaches and joint aches are satisfactorily controlled by salicylates.

If albuminuria occurs the patient should be placed on a nephritic diet until it has disappeared but this complication is a rare one.

Care should be taken not to overlook some complication of the pneumonia while laboring under the belief that all the symptoms are due to serum disease.

The ordinary therapeutic measures used in the care of pneumonia patients must, of course, be carried out in conjunction with the serum treatment although the use of serum will often greatly reduce the need.

BRONCHO-PNEUMONIA.

Treatment is essentially the same as for lobar pneumonia except that the disease generally runs a milder, but longer, course. Nutrition, therefore, is more important.

Bronchitis is often associated with broncho-pneumonia, and when this is the case, expectorants may be of service during convalescence. They are contraindicated in the acute stage.

The broncho-pneumonia of influenza may be very severe in character (see Influenza, p. 169).

BRONCHITIS.

ETIOLOGY.

Acute bronchitis commonly follows infections of the upper respiratory tract and especially infections by the pneumococcus or influenza bacillus. It occurs symptomatically in some infectious diseases, e.g., typhoid and measles.

Chronic bronchitis is often associated, in old or middle-aged persons, with *slight cardiac insufficiency* or with emphysema. Rarely, gout is a factor.

Excessive inhalation of tobacco smoke may be a factor in the production or continuance of bronchitis.

DIAGNOSIS.

Acute or chronic bronchitis may be simulated by tuberculosis and, therefore, sputum examination is imperative. Many cases of bronchiectasis following influenza are wrongly diagnosed as bronchitis or as phthisis.

ACUTE BRONCHITIS: TREATMENT.

1. When there are constitutional symptoms the patient should keep warm and avoid change of temperature by staying indoors.
2. If there is fever, bed may be advisable or necessary.
3. Bronchial secretion must be expectorated, but unproductive cough should not be allowed to fatigue the patient or to prevent sleep.

If the cough comes from pharyngeal irritation (p. 165), lozenges may suffice to check it; if from the larynx or trachea, steam inhalations (p. 167) may be serviceable. If necessary for relief of cough codeine sulphate $\frac{1}{4}$ gr. (or 0.016 gm.) or diacetylmorphine hydrochloride $\frac{1}{2}$ gr. (or 0.005 gm.) may be prescribed for use in the afternoon or at night. Morning cough is generally needed to clear the lungs. It can be promoted by a hot drink.

4. Substernal distress or pain, see tracheitis, p. 169.
5. Expectorants are contraindicated during the acute stage of bronchitis because they irritate the inflamed mucous membrane. They may be used during convalescence, at which time the expectoration is often tenacious and difficult to raise.

6. Several weeks are generally required for complete recovery, but when the patient feels well he may be allowed to resume his occupation. Smoking and cold bathing should be resumed cautiously and unnecessary exposure should be avoided as long as expectoration persists.

CHRONIC BRONCHITIS: TREATMENT.

1. Expectorants are generally beneficial, particularly potassium iodide in the dose of fr. 5 to 10 grs. (or 0.3 to 0.6 gm.), *t.i.d.*, or in the form of syrup of hydriodic acid one dram (or 3.70 mils.) in water three to five times a day.

2. When there is any sign of cardiac insufficiency, appropriate stimulants are indicated. For slight insufficiency the Compound Squill Pill may act well both as a heart stimulant and as an expectorant. The usual dose is from 6 to 9 pills daily. They should be freshly prepared. Systematic cardiac treatment may be required.

3. An equable and warm climate may promote comfort, especially for elderly persons.

4. If the presence of bronchiectasis be suspected treat the case as one of bronchiectasis.

5. Acute exacerbations of chronic bronchitis may be treated much as is acute bronchitis, but severe symptoms generally indicate that some form of pneumonia has developed, and treatment should be regulated accordingly (p. 153).

6. Codeine sulphate or heroine hydrochloride should not be used consecutively over long periods on account of the danger of forming a habit.

7. The bronchitis of overfed patients is often benefited by depletion. Exclude gout as a factor.

8. Excessive cigarette smoking may aggravate the condition, or be an important factor in its causation.

BRONCHIECTASIS.

Note.— The disease is chronic, lasting for thirty years, more or less. The patient may be subjected to recurring attacks of broncho-pneumonia, or of hemoptysis. Many patients have

emphysema or asthma.† The condition is often diagnosed wrongly as bronchitis or tuberculosis. Many cases are traceable to influenza. The sputum, typically, is abundant, purulent, greenish, nummular, can be raised at will by coughing, and often contains abundant influenza bacilli as well as various other organisms. Repeated examinations may be necessary to demonstrate the influenza bacilli. The cavities may be localized in one lobe or disseminated throughout both lungs. Nutrition is generally good. As the physical examination may show only a few râles, the diagnosis must rest on the history, the character, and the amount of the sputum.

TREATMENT.

No method yet devised offers hope of cure.

Efforts must be directed to relieving the patient as far as possible from unpleasant symptoms.

1. Teach the patient to drain his cavities on rising in the morning, and, if necessary, once or twice later in the day. This can be facilitated by taking a drink of hot water, tea or coffee at such times. Potassium iodide fr. 5 to 10 grs. (or 0.3 to 0.65 gm.) or other expectorants may be used if the secretion be too viscid to come up readily.

Gomenol * min. 3 (or 0.2 mils) in capsule *t.i.d.* is sometimes of value.

2. Avoid sedatives because they check free expectoration. The material then decomposes in the cavities and gives a foul odor to the breath and to the sputum.

3. In extreme instances of retained secretion the condition with its dyspnea and cyanosis may simulate bronchial asthma. A differential diagnosis can be made from history and sputum. An emetic will give immediate relief by clearing the lungs.

4. Most of these patients are better in warm weather. A uniformly mild climate may relieve but cannot cure.

5. Sputum must not be swallowed because diarrhea may result.

6. Foul-smelling sputum means inefficient drainage of cavities.

† Empyema, abscess, arthralgia, or pneumothorax occur in rare instances.

* A preparation of Oleum cajuputi (U.S.).

The odor can be ameliorated by the use of 3 min. (or 0.2 mils.) of Eucalyptol on a lump of sugar several times daily.

7. When the disease is localized in one lobe of the lung the chance of relief by surgical means may be considered.

ACUTE INFLAMMATION OF THE UPPER RESPIRATORY TRACT.

REVISED BY GERALD BLAKE, M.D.

Etiology: infectious in most instances. The pneumococcus, streptococcus, staphylococcus, influenza bacillus, diphtheria bacillus, micrococcus catarrhalis or other bacteria may be causative. Among predisposing factors lowered physical resistance and exposure to cold are important.

Course of Disease. Inflammation generally begins in the nasopharynx (pharyngitis). It usually extends within a few days to the nasal mucous membrane (coryza) and often to the tonsils (tonsillitis) or larynx (laryngitis). The severity and extent of the inflammation depends chiefly on the kind and virulence of the infecting organism and on the resistance of the patient.

Complications and Sequelae.

- | | |
|------------------------------------|------------------------------------------------------------------------------|
| 1. Bronchitis. | 8. Bronchiectasis. |
| 2. Otitis media. | 9. Septicemia. |
| 3. Peritonsillar abscess. | 10. Meningitis. |
| 4. Lobar or broncho-
pneumonia. | 11. Peritonitis. |
| 5. Arthritis. | 12. Inflammation of the antrum,
frontal, ethmoidal or sphenoidal sinuses. |
| 6. Endocarditis. | |
| 7. Glomerulo-nephritis. | |

Diagnosis. Exclude whooping-cough, scarlet fever, measles and diphtheria. The diagnosis of diphtheria, in some cases, can be made by culture only. Therefore the safest plan is to take a culture in every case of inflammation of the throat and, if the report be negative but the signs suggestive of diphtheria to take another culture.

PROPHYLAXIS.

1. If there is a reasonable probability that the symptoms are due to diphtheria or to one of the exanthemata isolate the patient provisionally.

2. If the clinical evidence points to diphtheria administer antitoxin (p. 271) to the patient without waiting for the report on the culture; or even if the first culture be negative.

Prophylactic inoculation of all persons exposed to diphtheria should be insisted on.

3. Patients having infections of the respiratory tracts should cover the mouth on coughing or sneezing.

4. Good ventilation of rooms occupied by the patient reduces risk of contagion.

TREATMENT APPLICABLE IN GENERAL.

1. Keep the patient in a warm, but well-ventilated room at a uniform temperature.

2. Promote rest and sleep, using sedatives or hypnotics when needed.

3. Move bowels, at outset, by enema or cathartic unless they have been acting freely.

4. Allay unproductive or irritating cough by lozenge or sedative.

5. Avoid local irritation by tobacco or concentrated liquor.

6. Cleanse mucous membrane frequently, and soothe inflammation by means of a non-irritating gargle. Warm water, with or without salt or sodium bicarbonate in it, or Liquor antisepticus alkalinus (N.F.) may be used diluted with 3 parts of warm water.

7. Antipyretics, *e.g.*, phenacetin fr. 5 to 10 grs. (or 0.3 to 0.65 gm.), with caffeine citrate 1 gr. (or 0.065 gm.), or salicyl preparations (p. 20), may alleviate discomfort especially if there be fever, malaise or pain.

8. Food should be readily digestible and easy to swallow.

Abortive Treatment. This can be effective in the early stages only, and seldom even then. The following measures may be tried.

1. Cleansing, non-irritating gargle.

2. Hot bath before retiring, or

3. Hot drink on retiring to produce sweating.
4. Early to bed, and hypnotic unless sleep comes quickly.
5. Catharsis by calomel or saline.
6. The patient should dress in a warm room and avoid cold bathing on the following morning.

METHODS OF TREATMENT.

ACUTE PHARYNGITIS.

1. Cleansing gargle every four hours.
2. Oil spray * after gargle to protect and soothe mucous membrane.
3. Check cough with lozenges when possible. Otherwise use codeine or diacetylmorphine.
4. Cases with constitutional symptoms of considerable severity may occur. "Lateral Pharyngitis" is typical of this group.

"Lateral Pharyngitis." Characterized by marked general toxic reaction associated with redness and swelling of the folds of lymphoid tissue at the sides of the pharynx. The severity of the general reaction is out of all proportion to the mildness of the local inflammation. Due to the pneumococcus.

Treatment consists in general measures of rest, catharsis, use of salicylates for relief of pain and reduction of temperature.

Local treatment. Touching the pharynx with 50% sol. silver nitrate is effective in relieving local inflammation.

CORYZA.

Keep the nose as free as possible from secretion.

Irrigation of the nose with an alkaline solution often gives much relief, but some physicians believe that this practice may lead to inflammation of the frontal sinus or middle ear. An oil spray * may be used to free the nasal passages.

If the secretion be profuse and watery, its quantity can be diminished by using $\frac{1}{200}$ gr. (or 0.00032 gm.) of atropine sulphate and repeating it in fr. 4 to 6 hours *s.o.s.* Atropine is contraindicated

* Petrolatum liquidum will serve. Menthol 5 grs. (or 0.3 gm.) or Eucalyptol 5 min. (or 0.3 mils.) or both can be added per oz. (or 30 mils.) of liquid petrolatum. The De Vilbiss atomizer is good.

when secretion is viscid or tenacious. Excessive dosage causes dryness of the throat, increases discomfort, and may cause severe poisoning.

Atropine can be used in the form of Tr. of belladonna leaves; dose from 10 to 30 min. (or 0.6 to 2 mils.).

ACUTE TONSILLITIS.

1. Take a culture.
2. Whereas the constitutional symptoms are apt to be severe it is generally advisable to keep the patient in bed.
3. Prescribe cleansing gargle to be used every four hours. The tonsils may be painted daily with argyrol, † fr. 10 to 20 per cent in watery solution (or a spray of 20% argyrol in water may be used after gargling).
4. An oil-spray,* used after gargling, may give some relief by allaying irritation.
5. An ice-bag collar may help much to relieve pain in the throat.
6. The diet must be easy to swallow. Cold drinks may be grateful.
7. Occasional doses of phenacetin or of a salicyl preparation (p. 287) may be beneficial for fever, malaise or pain.
8. Opiates or hypnotics are indicated sometimes.
9. Salicylate (p. 287) in large doses acts well in some cases of tonsillitis having slight articular symptoms due probably to streptococcus infection.
10. Note at first visit the size, position and sounds of the heart, and the presence or absence of murmurs. Watch for any change and before discharging the patient, determine whether the heart or the kidneys have suffered.

ACUTE LARYNGITIS

1. Scarification, intubation or even tracheotomy may be required for edema.
2. Steam, plain or medicated, ordinarily gives relief. It

† U. S. t.

* Petrolatum liquidum will serve. Menthol 5 grs. (or 0.3 gm.) or Eucalyptol 5 min. (or 0.3 mils.) or both can be added per oz. (or 30 mils.) of liquid petrolatum. The De Vilbiss atomizer is good.

should be used every few hours or as desired. The steam can be inhaled from the mouth or from a pitcher containing boiling water. To the water may be added 1 drach. (or 4 mils.) of compound tincture of benzoin. A steam atomizer which can be used to spray oil and steam together is still better. For very sensitive throats the steam and oil may act better without other ingredients, but Menthol 5 grs. (or 0.3 gm.), or Eucalyptol 5 min. (or 0.3 mils.), or both can be added per oz. (or 30 mils.) of Liquid petrolatum.

Excessive dryness of the air of the room is harmful. It can be mitigated by allowing steam to escape constantly from kettle or chafing dish.

3. Cough must be checked and talking minimized.
4. Smoking is especially harmful as a rule.

ACUTE TRACHEITIS.

Treatment as for laryngitis may suffice.

A flaxseed or mustard poultice * for the upper chest or steam inhalation may help to relieve substernal distress. Mustard should be avoided if resulting pigmentation would contraindicate its use. "Gomenol jujubes" † taken every 3 to 6 hours may relieve.

INFLUENZA.

BY GERALD BLAKE, M.D.

Note.—The etiology is in dispute, but it seems probable that the initial disease is caused by the influenza bacillus, and that pulmonary and some other complications are attributable to secondary infections in which a variety of organisms may play a part. Among these may be mentioned streptococcus hemolyticus, staphylococcus aureus, pneumococcus and micrococcus catarrhalis.

TYPES OF INFLUENZA.

I. Respiratory.

- A. Mild like severe coryza.
- B. Bronchitic.
- C. Bronchopneumonic.

* See textbook on nursing.

† A preparation of Oleum cajuputi (U.S.).

II. Gastrointestinal.

D. Gastric.

E. Intestinal.

Certain symptoms are common to both types, viz: sudden onset, prostration, fever, headache, pain in back and extremities.

PROPHYLAXIS.

1. Isolation to prevent spreading of the contagion should be carried out in all cases.
2. The use of masks and gowns is advisable for doctors and nurses. Care should be taken that the mask is changed at each visit, or that some mark should be made on the inner surface of the mask so as to prevent the mask being put on inside out at subsequent visits. The application of Boric Acid Ointment inside the nostrils is probably of value in preventing the contagion reaching the mucous membranes.

TREATMENT.

It is of the utmost importance that the patient go to bed immediately at the onset of infection, and remain in bed until recovery is complete in order to prevent complications, and to conserve strength.

General principles of treatment as of Acute Infectious Diseases, page (75)

A. Mild Respiratory Type.

Characterized by the symptoms of acute infection of the upper respiratory tract; coryza, pharyngitis, tonsillitis. Epistaxis is common and may be repeated and severe.

General principles of treatment as of Acute Infections of Respiratory Tract, page (161)

1. Salicylates may be given for the control of pain and reduction of temperature, but should be used cautiously because of depressant action on heart.

2. Local treatment as of Acute Pharyngitis, page (165)

3. Epistaxis is best controlled by an anterior plug of gauze wrapped in Cargile membrane. Care should be taken to dip the

plug and forceps in hot water just before insertion in order to prevent the plug from adhering to the forceps. Posterior plugging of nares is seldom necessary.

B. Bronchitic Type.

Characterized by a persistent cough, substernal pain and signs of bronchitis.

Treatment as of Acute Bronchitis, page 155.

1. Expectorants are probably harmful in the early stages, and of little value in the later stages of the bronchitis.
2. A change from a damp to a dry climate is sometimes the only measure which seems effective in clearing up the persistent cough.

C. Bronchopneumonic Type.

Characterized by symptoms of bronchopneumonia.

1. The foci may be numerous and tend to spread; there is a relatively low rate of pulse and respiration, and evidences of severe toxemia.
2. The sputum may contain much blood.
3. Involvement of the pleura is comparatively rare, although the physical signs are confusing.
4. Cyanosis and dyspnea are indications of the severity of the toxemia. It is particularly fatal in pregnant women.

Serum Treatment: The blood should be obtained from a patient convalescent from influenza broncho-pneumonia whose temperature has been normal from eight days to six weeks, preferably ten days, and who has a negative Wassermann test. Five hundred mils. of blood may be taken twice at an interval of one or two days. The blood is received in a sterile bottle which is then placed in an incubator at body temperature for one hour. It is then put in a refrigerator for five or six hours, or over night. The serum is then decanted and centrifugalized to remove bits of fibrin or red cells, after which serum obtained from all donors is mixed. This "pooling" of serum is desirable as providing serum from severe as well as light cases. To the pooled serum is added one and five tenths per cent tricresol (made up in physiologic sodium chloride solution) in the proportion of 20 mils. to every 100 mils. of pooled serum. The serum is then stored in 120 mil amounts. Such serum is effective up to six weeks after storage.

Intravenous injection of 120 mils. of the serum, heated to slightly above body temperature, is performed and may be repeated on the following day, and again on the third day if necessary. When effective, there is a fall of temperature either by crisis or lysis usually within forty-eight hours. The sooner serum treatment is started after the diagnosis has been made the more reason to hope for good results from its use.*

General treatment is that of Lobar Pneumonia, page 141.

D. Gastric Type.

Characterized by severe epigastric pain and vomiting. There may be spasm of the abdominal muscles. An inflammatory process is excluded by the presence of general symptoms of influenza and the low leukocyte count.

General treatment is that of Acute Infectious Disease, page 75.

Symptomatic treatment as of Acute Indigestion, p. 221.

Alcohol by mouth may be of distinct value where other food is not retained.

E. Intestinal Type.

Note.—Exclude dysentery and typhoid by laboratory tests.

Characterized by diarrhea, general abdominal discomfort, loss of appetite, etc.

General treatment as of acute Infectious Diseases, page 75.

Symptomatic treatment as of simple diarrhea, page 225.

COMPLICATIONS AND SEQUELAE.

1. Empyema is rare, and when present is usually encapsulated or interlobar. When suspected, thoracentesis should be done, and if without result should be repeated at another point.

2. Bronchiectasis is a common sequel.

General treatment is that of Bronchiectasis, page 157.

3. Mental symptoms of depression, or true psychosis, together with profound physical weakness, are common.

The treatment depends on their severity; rest being sufficient in the less severe cases. Sanitarium treatment is necessary in the more severe cases.

4. The possibility of meningitis and encephalitis should not be forgotten.

* Method of L. W. McGuire and W. R. Redden.

CHAPTER VI.

PULMONARY TUBERCULOSIS.

BY JOHN B. HAWES, 2ND, M.D.

Synonyms.—Consumption, Phthisis, Tuberculosis of the lungs.

Etiology. The tubercle bacillus, discovered by Robert Koch in 1882. Tuberculosis is not inherited. It is of the utmost importance that this should be clearly and definitely understood by everyone. It should be likewise borne in mind, however, that a predisposition toward the disease or a weakened resistance against it may be and often is inherited. Among the factors predisposing a patient toward tuberculosis are overwork or bad conditions of work, such as the dangerous trades, etc. A trade may be dangerous because of its inherent qualities, such as the granite and iron industries, which are dangerous on account of the dust; jewelry industries, whereby the worker is exposed to acid fumes, etc., and many other such occupations, or an occupation may be dangerous because of the bad conditions under which the work is carried on. Among such bad conditions may be mentioned poor ventilation, exposure to extreme heat or cold, absence of sunlight, etc. Poverty and poor living conditions are perhaps the most important etiological factors in tuberculosis. The whole housing problem is intimately mixed up with that of tuberculosis. Bad habits, alcoholism, etc. are factors. Certain acute diseases, such as measles and whooping cough, may leave the lungs in a condition to contract tuberculosis or bring into activity an old process. The recent epidemic of influenza has undoubtedly brought into activity numerous heretofore quiescent cases of tuberculosis, while in certain cases during the late war, exposure to poisonous gases has brought about the same result. In general, anything which lowers the bodily resistance is a predisposing factor toward tuberculosis.

COURSE OF THE DISEASE.

Pulmonary tuberculosis is one of our most chronic diseases. It usually lasts from two to seven years. In certain acute cases, however, where the patient has received an overwhelming infec-

tion or where the patient's resistance is greatly lowered, it may run a more rapid course, ending fatally within a few months, or even weeks. In such cases, toward the end, at least, the disease is not confined to the lungs, but becomes a general septicemia, or it may develop into a tuberculous meningitis. Likewise, although two to seven years is the average course, a person may have tuberculosis for a very much longer time, and with it, live to a great age. In fact, it is undoubtedly true that many cases of chronic bronchitis, winter cough, etc. are really cases of this chronic form of tuberculosis. The disease is characterized by intermissions,— periods varying from a few months to many years, during which it is inactive, with few or no symptoms, perhaps only a slight morning cough and raising of sputum. During this time it is spoken of as being arrested, or semi-arrested, or even apparently cured. The physician is rash, however, who speaks of any case of pulmonary tuberculosis as being actually cured. The object of treatment is to bring about as permanent arrest as possible.

COMPLICATIONS AND SEQUELAE.

1. Tuberculosis elsewhere in the body, especially the intestines, genito-urinary tract, and fistula in ano.
2. Hemorrhage. It should be borne in mind that hemorrhage, though always an alarming symptom, is rarely a serious one, except when the disease is in the active and progressive stage.
3. Cardiac weakness, due to the toxins generated by the tubercle bacillus.

DIAGNOSIS.

In the diagnosis of any case of tuberculosis, bear in mind the following:

1. Absence of proof is not proof of absence. Because you cannot find definite proof that tuberculous disease is present, do not assure a patient that he is not tuberculous.
2. Differentiate between tuberculous infection and tuberculous disease. Practically every one of us, by the time the fourteenth year is passed, has a tuberculous infection, while only comparatively few of us are doomed to have tuberculous disease. The

distinction is of immense importance, and is one that is frequently lost sight of.

3. Errors in diagnosis are more often due to a lack of thoroughness and because the physician is in a hurry than to any great inherent difficulty in the diagnosis itself.

4. If you are in doubt about the diagnosis, do not be afraid to explain this frankly and openly to the patient, and if necessary, to send him to some one else for a decision. Remember that the patient's whole future depends upon the correctness of your diagnosis.

History. A carefully taken history is of immense importance in diagnosis. Do not be in a hurry, but be prepared to take the time to sit down and talk this quietly over with the patient, and if possible with some member of the patient's family.

Family History. Inquire in every case if any member of the patient's family has had or has died of tuberculosis. Do not draw too many conclusions from this, however, either one way or the other. Remember that it is the intimacy of exposure in childhood, rather than exposure in adult life that is of importance.

Past History. Inquire into the diseases of childhood, with special reference to measles and whooping cough, and ascertain whether or not there was any period of invalidism or cough following such disease. Find out whether the patient was looked upon as strong and robust during youth, or delicate. Find out if the patient was susceptible to coughs and colds, and inquire into such indefinite conditions as "run down," "slow fever," "debility," "anemia," etc. Such terms are often used to cover the physician's inability to make a proper diagnosis.

Present Illness. Inquire when a patient last felt perfectly well, as well as when he first felt sick. Ascertain definitely what was the first symptom or group of symptoms of which he complained. Do not be surprised if in many cases no mention of a cough or sputum is made. Remember that the onset of tuberculosis is more often characterized by general constitutional symptoms, such as loss of weight, strength, energy, etc., than by symptoms relating to the lungs. In inquiring in regard to loss of weight, bear in mind the following definition: "By loss of weight should be understood an unexplainable loss of at least five percent below normal limits for that particular individual within four months' time." Likewise, in

regard to loss of strength: "By loss of strength in its pathological sense, is meant undue fatigue and a lack of staying power which are unusual for that individual patient and which cannot be satisfactorily explained." Inquire in every case as to whether the patient has ever spat up any blood or has had a hemorrhage of the lungs. Go into the details of this, and remember that hemorrhage may be defined as follows: "Any amount of expectorated blood, with or without sputum, may mean that tuberculosis is present and requires careful and thorough investigation as to its source. Blood streaks, blood spots, etc. may or may not mean tuberculosis. On the other hand, a hemorrhage of one or two teaspoonsful is presumptive evidence of the disease."

Cough. Inquire as to cough, but bear in mind that there is no cough characteristic of tuberculosis. There may or may not be a frequent hacking cough; likewise, there may be any other kind of a cough. Sputum may or may not be present. The absence of sputum does not in any way militate against the patient's having tuberculosis.

PHYSICAL EXAMINATION.

Fever. Take careful observations of fever over a period of at least four days, four times daily, and remember the following definition: "An occasional temperature of 99 should not be considered 'fever.' A temperature which persistently runs over 99.4 when taken at least four times a day for a period of one week (by mouth five minutes) should be considered of significance and to constitute 'fever.'" While a fever, as defined above, is not absolute proof that the patient is suffering from tuberculosis, it is presumptive evidence that the patient is suffering from a toxemia of some kind. In the absence of other causes for such a fever, tuberculosis should be very seriously considered.

Elevation of Pulse. Where the average normal pulse is already known, an elevation of 15 beats per minute when the pulse is taken quietly at home, during various periods of the day, should be considered abnormal. In cases where the average pulse is not known, an average pulse of 85 or over in men, and 90 or over in women, may be considered to be abnormal. A combination of a subnormal temperature and an elevated pulse as defined here is of great importance. Hyperthyroidism and certain cardiac dis-

orders are the commonest causes of a rapid pulse aside from tuberculosis. A persistently rapid pulse, however, combined with fever, as defined above, in the absence of hyperthyroidism is evidence in favor of tuberculosis.

Anemia. This may or may not be present.

General Appearance of the Patient. Put down definitely whether or not the patient looks sick, but bear in mind that extensive tuberculous disease of the lungs may be, and often is, present when the patient presents an appearance of robust health.

Tuberculosis Elsewhere in the Body. Tuberculosis elsewhere, except in the throat or intestines, does not necessarily indicate that the lungs are involved, but in every case means that they should be carefully examined.

Hoarseness. Any hoarseness or persistent huskiness requires investigation. A tuberculosis lesion in the throat or vocal cords is presumptive evidence that there is or has been disease in the lungs.

Sputum. The presence of sputum is not necessary for a positive diagnosis. Absence of bacilli in the sputum after one or several examinations is not necessarily proof that there is no tuberculosis present. The diagnosis must be made in the majority of cases before the sputum is positive.

When constitutional signs and symptoms are absent or nearly so, and when in the patient's present or past history there is nothing that points to tuberculosis, definite signs in the lungs including persistent rales at one or both apices should be demanded before a definite diagnosis is made, in the absence of a positive sputum. By "persistent" is meant that the rales must be present after cough at two or more examinations, the patient having been under observation for at least a month.

When there are definite constitutional signs and symptoms, such as loss of energy and strength, fever, rapid pulse, etc., it is not necessary to have very marked signs in the lungs in order to make a positive diagnosis. In the majority of instances, however, careful examination will reveal some pulmonary abnormality, but not necessarily rales. Usually a process at the apices should be considered tuberculous, and a process at the base to be non-tuberculous until the contrary is proved, unless there is a clear history of pleurisy with effusion. One should consider a typical

pleurisy with effusion as presumptive evidence of tuberculosis; a dry pleurisy or a thickening of the pleura, requires careful questioning and investigations, but is not necessarily evidence of tuberculosis. When in doubt, keep the patient under observation for at least one month with repeated sputum examinations before a definite diagnosis is made one way or the other. Depend more on the thermometer and common sense than on the stethoscope, and remember that "absence of proof is not proof of absence."

X-Ray. An X-Ray examination is a valuable adjunct and may give important additional information. A definite diagnosis, positive or negative, however, should never be based on the X-Ray examination alone. The final diagnosis rests in the hands of the clinician and not with the roentgenologist.

PROPHYLAXIS.

Remember at all times that tuberculous infection takes place in childhood. Likewise remember that adult infection is rare, and that the average healthy man or woman living under normal hygienic conditions need not fear contracting tuberculosis. The prophylaxis of tuberculosis, therefore, is largely the protection of infants and children from sources of infection. This means:

1. Destroying all sputum whether or not tubercle bacilli have been found in it. See that the patient uses a sputum cup, flask, or cloth, or paper napkins which can be burned.
2. See that the patient is trained to place his hand or handkerchief in front of his mouth when coughing or sneezing. Bear in mind, likewise, that this applies not only to the patient with tuberculosis but to every individual, man, woman or child.
3. Make it an absolute rule not to allow a consumptive to live intimately with children. If the patient cannot, or will not, take proper precautions or go to a proper institution for treatment, the children should be removed from such a source of infection. Even in cases where the danger of infection is apparently very slight, every tuberculous patient should be carefully instructed to avoid close and intimate contact with children.
4. Careful cleansing of the room or premises in which a con-

sumptive has lived. Chemical fumigation is now rarely used. Mechanical cleanliness, soap, water, scrubbing, repainting and repapering is the best means of treating such rooms or premises in order to make them safe. Remember that sunlight will kill germs of tuberculosis in a comparatively short while, and that under ordinary circumstances blankets, mattresses, etc. that have been used by a consumptive may be rendered safe by exposure to sunlight for a few hours.

5. Observance of the ordinary rules of hygiene and right living as to work, sleep, play, food and drink, is the best way for the average person to avoid contracting tuberculosis.

TREATMENT IN GENERAL.

Treatment of the Individual. Treatment should be active and aggressive. It should begin as soon as the physician has made the diagnosis in his own mind. In certain cases this may be before he has seen fit to tell the patient definitely that he has consumption. In the vast majority of cases, however, it is far better, except in the case of children, to talk the matter over plainly and frankly with the patient, and in every instance the physician should make the exact situation clearly understood to some relative or friend. Plain medical terms should be used as much as possible. Do not tell the patient that he has weak lungs, a spot on the lungs, or that his lungs are affected. Let him know plainly that he has pulmonary tuberculosis, and explain exactly what this is, and what it means. In many cases it is wiser not to use the word "phthisis" or "consumption," as both of these terms are apt to alarm the patient and his friends unnecessarily. If you yourself are in doubt about the diagnosis, and merely suspect that tuberculosis is the cause of the symptoms but are not sure of it, explain this situation clearly and frankly to the patient and to his relatives and friends. In such instances, it is a good rule to put the patient on trial for one month, and to let him know that if at the end of this time he is not distinctly better and the symptoms still persist, that more radical treatment will have to be instituted. In certain cases, however, owing to a lack of intelligence on the patient's part, or owing to improper home conditions,

it is wiser to institute sanatorium treatment at once, even if the diagnosis is not clear. Methods of treatment include the following:

1. Sanatorium treatment.
2. Home treatment.
3. Climatic treatment.
4. Tuberculin.
5. Heliotherapy, or sunlight treatment.
6. Drugs.

SANATORIUM TREATMENT.

Despite statements to the contrary, that home treatment is the best method, it is the general consensus of opinion, demonstrated clearly for the past quarter century, that sanatorium treatment, in the broadest sense of the term, is the best method that is at present available for handling the individual consumptive. The patient's length of stay in a sanatorium may be short or long, according to circumstances. The patient's standard of intelligence, home conditions, finances, mental attitude toward treatment, are all factors in determining the length of stay in an institution, but it may be safely stated that at some time or other, the vast majority of tuberculous patients should have the training and instruction that only a sanatorium can afford. It should be borne in mind, however, by every physician, and by him imparted to his patients, that sanatorium treatment, even of long duration, rarely if ever cures a tuberculous process, and that the best it can do is to bring about an arrest of the disease, which may continue for a long or short time, as the case may be. The patient's stay in a sanatorium, important and vital as it is to his welfare, should be looked upon as only a part of his treatment, the more important part of which being that period which follows his discharge from the sanatorium. Sanatorium treatment, therefore, in its broadest sense, should mean not only that the patient is under care and supervision while he is in the institution, but that the details which he has learned and the methods of treatment which he has found to be essential to his welfare while in the institution, should continue for months or even years after he has left its doors.

In many states of this country, where there is only one public

sanatorium for the entire population, providing a number of beds utterly inadequate for the needs of the community, sanatorium treatment in such instances may necessarily be reserved for the lucky few who, either because their physical condition warrants it, or because their finances are able to afford it, are able to secure admittance. In such cases, proper home treatment is the only other resource. In Massachusetts and in other eastern states, there are enough bed facilities for practically every consumptive seeking admission, and in Massachusetts, at least, a consumptive, no matter how poor his circumstances, and no matter how far advanced his disease, can readily secure adequate sanatorium or hospital treatment. It is the duty of every physician who attempts to handle this disease adequately, to make himself acquainted with the facilities open for consumptives in his community. He should be prepared to give the patient accurate details as to what steps he must take for admission to a state, county, or local sanatorium or hospital, and he should not, as is too often the case, deal only in vague generalities, leaving the practical details to the patient or his family, whose burden is usually already sufficiently great.

In selecting a sanatorium for his patient, the physician should consider the following points:

- (a) Cost per week.
- (b) Accessibility.
- (c) Climate and altitude.
- (d) Temperament and disposition of the patient.
- (e) Length of time patient expects to remain at the sanatorium.

Cost per week. Many patients are apt to be utterly stampeded, when they are first told that they have consumption, into spending at once the hard-earned savings of years. They are apt to scorn a state institution, and to demand at once that they be sent to a private sanatorium, utterly regardless of its high cost. The physician should carefully inquire into the patient's financial circumstances. He should remind him that he is dealing with a chronic disease, which, unlike typhoid or pneumonia is apt to last many months or even years. The patient should be prepared to put aside all pride, and to look at the matter from a sound, economic viewpoint. There are many patients who refuse to go to a state or local institution because they believe that by so doing,

they become objects of charity. This, in Massachusetts at least, has been done away with, and the worthy and needy patient who receives free treatment in a sanatorium is no more an object of charity than are all other citizens of the Commonwealth who are given police and fire protection, and free education for their children.

Accessibility. One of the most important factors in the treatment of tuberculosis is to keep the patient happy and contented. In selecting a sanatorium, therefore, it is important to consider its distance from the patient's home, and to consider the expense and time necessary for friends and relatives to visit the patient. In many instances, it is advisable to send the patient to an institution which is perhaps not so well located in other respects as compared with a more distant one, but which is in easy reach by train or trolley for friends and relatives.

Climate and Altitude. No definite law can be laid down to either climate or altitude as to its effect on the individual patient. Although there is absolutely no doubt that a suitable climate, high and dry, is an important factor in the treatment of tuberculosis, to the vast majority of patients such a climate is impossible. It should also be remembered that a patient who is sent away, and who gets well in such a favorable climate, may never be able to return to his home, or to stand the climate in the locality in which he expects to live and spend the rest of his life. In New England, therefore, and in the majority of the Eastern states, for all save the wealthy consumptives, it is better for the patient to take the cure in the climate in which he expects or hopes to live. Much the same applies to altitude as to climate. In the Eastern states there is not enough altitude to be an important factor in treatment, while Colorado and the West is full of patients who can maintain their health under western conditions, but who are prisoners as far as returning to their homes in the East is concerned. These are the important factors which should be carefully considered by the physician.

Temperament and Disposition of the Patient. Happiness and contentment are more important than fresh air and altitude to the majority of patients. Here again, individualization is necessary. In some instances, it is distinctly better for the patient to be separated from home influences and surroundings. Such patients

are apt to take their treatment more seriously, and to realize that they are to work on a very grave and important task. On the other hand, there are patients for whom it is essential that they be in constant and near communication with friends and relatives. The best of food, care and attention, and the most beautiful surroundings will avail but little in such cases, unless there is mental peace and contentment.

Length of Time Patient Expects to Remain at the Sanatorium. If the patient's home conditions are such that treatment may be carried on very well after he has learned what to do, he may be advised to go to a private sanatorium for a few weeks or months at a cost which it would be utterly impossible for him to continue for six months or a year. If, however, the physician believes that it is wiser for the patient to spend a long period at the institution, this and the cost per week must be given careful consideration.

HOME TREATMENT.

Patients may be divided into three groups as far as home treatment is concerned:

1. Suspicious cases, cases under observation, and those in whom the diagnosis is not absolutely definite.
 2. Arrested and apparently arrested cases, whether or not discharged from a sanatorium, and those in whom the disease is inactive.
 3. Patients with active tuberculosis who should go to a sanatorium or hospital but who by force of circumstances must be treated at home.
1. Suspicious cases, etc. It should be made clear to all patients in this group that home treatment may be only a temporary measure, and that more active treatment in a sanatorium may be and probably will be necessary.
 2. Arrested and apparently arrested cases, etc. This group is a large one, comprising all those patients who have spent some time in a sanatorium. Whether or not subsequent home treatment will be successful depends largely upon how well the patient has learned his lesson while in an institution. Close medical and nursing supervision is essential in these cases, if the good done at the sanatorium is to be made permanent. There is no class

of patients in whom hard work on the part of the physician and nurse will bring about better returns. Home treatment is naturally the best for the majority of these cases. How strict this should be in regard to outdoor sleeping, rest, etc., depends on the individual case. Frequent visits to the home by the nurse, and monthly examinations at the dispensary or doctor's office should be required. The amount of work done, and the choice of employment, are to be decided by the physician.

3. Patients who should go to a sanatorium but who either cannot or will not do so. In Massachusetts and in many of the eastern states this group should be a small one; elsewhere, because of lack of beds, it is bound to be a large group.

The essentials of successful home treatment are:

1. Adequate and detailed supervision of the patient by physician and nurse.
2. Close coöperation between patient and physician.
3. Provision for outdoor sleeping.
4. *Prolonged rest.*
5. Finances sufficient to insure proper food and nursing.

Home treatment may be substituted for sanatorium treatment,—

- (a) When there are no children in the family who might be exposed to the disease in the open form.
- (b) When the intelligence of the patient or the patient's family is such that adequate carrying out of details is possible.
- (c) When adequate nursing and medical supervision is available over a sufficiently long period of time.
- (d) When there are facilities at home for proper outdoor treatment under favorable hygienic surroundings.

It should be explained to the patient that it may become necessary at any time for him to return to the sanatorium or hospital on signs of an impending breakdown.

Common sense, optimism, patience and tact, are essential factors in treatment.

CLIMATIC TREATMENT.

Before advising a patient to undertake a journey of any considerable distance in order to obtain the advantages of any special climate, the physician should consider the following points:

1. The cost of transportation, and the cost of board after arrival. No patient should be sent to Colorado, for instance, unless he has at least \$500. or better still \$1000., with which to pay the necessary expenses.

2. Will the patient be happy so far away from his relatives and friends?

3. Has the patient funds sufficient to maintain him comfortably for at least one year?

4. The physician should see that the patient is placed immediately under high-grade medical advice as soon as he arrives at his destination. This should never be left to chance, nor should it be left to the patient to select his own physician.

5. In case the patient has shown a tendency to pulmonary hemorrhages, or in case there has been any sign of cardiac weakness, if the place to which you are considering sending him is at a considerable altitude, will it be safe for the patient in question?

6. If the patient is in the far advanced or progressive stages of the disease, in the majority of instances it is unwise to send him far away.

7. Remember in every case that even if the patient gets an apparent arrest of his disease in a certain favorable climate, that it may be impossible for him to live in any other climate, or to return home to live with his relatives and friends.

On the other hand, the physician should remember that it is undoubtedly true that there are many cases where the points above mentioned do not apply; where the patients will be distinctly benefited by seeking the advantages which a different climate and perhaps a greater altitude can provide.

TUBERCULIN TREATMENT.

As a rule the general practitioner should not undertake the treatment of his patients with tuberculin. This should be left to the discretion of the physician who has had experience and training in this method of treatment. While it has been fairly definitely proven that in certain selective cases treatment with tuberculin, carefully carried out for a long period of time, seems to prevent a certain percentage of relapses that would otherwise have occurred, if carelessly handled by those inexperienced in its use tuberculin can do distinct harm.

HELIOTHERAPY OR SUNLIGHT TREATMENT.

Under careful supervision this may be applied in certain cases of pulmonary tuberculosis. A physician should not use this method of treatment, however, until he has made a careful study of the subject and familiarized himself with all its details. It is of particular value in the case of children with tuberculosis of the bronchial glands or elsewhere. It should be borne in mind, however, that sunlight is a powerful agent and may do harm as well as good. The general principle of sunlight treatment is to expose the body gradually, one part at a time, to increasing amounts of sunlight so that eventually the skin of the entire body becomes deeply pigmented. It is a curious, but well known, fact that those patients whose skin shows a tendency to burn rather than to tan do not react well to sunlight treatment. In the treatment of all cases the head should be kept covered, and there should be a wet cloth over the cardiac area when the chest is being exposed.

Sunlight treatment is of particular value in the high altitudes where there is not only apt to be more sunlight, but where the rarified condition of the air allows a larger proportion of the sun's rays to penetrate. To many patients in the East, sunlight treatment is hardly available.

TREATMENT BY DRUGS.

Drugs, in the treatment of pulmonary tuberculosis, are used merely to treat symptoms, never the disease itself. The intestinal tract must be kept clear, hence, saline or vegetable laxatives are often needed. Diarrhea must be checked. Excessive, unproductive and irritating cough must occasionally be allayed. In certain instances, a mild tonic to stimulate appetite is indicated. Aside from these, no drugs are needed in the treatment of pulmonary tuberculosis.

TUBERCULOSIS IN CHILDREN.

DIAGNOSIS

The physician should bear in mind always that the younger the child the more nearly does tuberculous infection approach to tuberculous disease. A positive tuberculin test, whether sub-

cutaneous, cutaneous, or intracutaneous, in a child five years or under, carefully performed and found positive after one or more applications, in the majority of cases means tuberculous disease as well as tuberculous infection. Remember at all times that in childhood the infection takes place first in the glandular system, and that by the time the lungs are definitely involved the disease is in the advanced stages. It is here that the X-ray will give specially important and valuable evidence, but as in the case of adults X-ray evidence alone is not sufficient on which to base a diagnosis. If, however, X-ray examination shows evidence of enlarged bronchial glands and the child shows constitutional signs and symptoms, fever, loss of weight and strength, etc., a positive diagnosis should be made even if according to clinical examination localizing signs in the lungs are conspicuous by their absence.

TREATMENT.

There is no more favorable method of preventing tuberculosis among adults than by the early and active treatment of tuberculous infection among children. For those children who show signs of active disease as described above, the tuberculosis hospital, sanatorium or the so-called " preventorium " is the best and most efficient means of treatment.

The source of infection in every case should be diligently sought for and eradicated if possible, whether this be bovine or human.

For those children in whom the evidence of disease is not sufficient grounds for breaking up the home or sending them away, the out-door school, the fresh air room, and the advice and supervision of the tuberculosis nurse, and adequate medical care, are the best means available for building up the child's strength so that the tuberculous infection will not become tuberculous disease.

NON-PULMONARY TUBERCULOSIS.

Although not properly included in the scope of this chapter, it is not out of place to call attention to certain points concerning this form of tuberculous disease. The physician should bear in mind at all times that tuberculosis, whether it occurs in the lungs or in the bones, joints, glands or other organs, is due to the same

organism no matter where the disease is located, and that while in many instances surgical methods are needed in the non-pulmonary form of the disease, in every case sunlight, fresh air, rest, proper food and hygiene are indicated. The physician treating this form of tuberculous disease should remember at all times that it is not a tuberculous gland or joint which is under consideration, but a man, woman or child who has the disease.

It is in this form of tuberculosis that treatment by means of tuberculin and heliotherapy brings about the most striking results.

TREATMENT OF THE TUBERCULOSIS PROBLEM.

Every physician has a duty to perform not only toward his individual patients, but one that concerns the tuberculosis problem as a whole. Community health although less tangible than the health of the individual is nevertheless of essential importance. Any disease which kills over 200,000 persons in this country every year constitutes a menace, in the elimination of which the medical profession should be the leaders. As far as tuberculosis is concerned the general practitioner can and should help in the following ways:

1. He should be a member of his local tuberculosis organization, or if none such exists should be active in forming one.
2. He should join his state association and the National Tuberculosis Association.
3. He should make himself thoroughly familiar with the local needs of his community and should help to establish, (a) a tuberculosis dispensary; (b) a visiting tuberculosis nurse; (c) proper school hygiene and inspection; (d) proper industrial and factory hygiene and inspection.
4. He should find out what facilities his state already provides for consumptives, what it does to prevent the spread of this disease, and what further facilities and provision are needed for the future.
5. He should use his own personal influence with city and state legislation, along with that of his state medical society, as a whole, to bring about proper health legislation to handle the tuberculosis problem.
6. He should report all active cases of pulmonary tuberculosis,

especially those with a positive sputum, promptly and accurately, and should coöperate with and not oppose the efforts of local and state health authorities.

The following are the most important measures and provisions that every community, state or municipal, aims to establish. It is the duty of the medical profession to help in this work.

- (a) Beds in hospitals and sanatoria for consumptives in proportion of one bed for every death from this disease.
- (b) Sanatorium provision for early and favorable cases; hospital provision for advanced, progressive, and emergency cases.
- (c) A tuberculosis dispensary, which should include a tuberculosis nurse, for every city or town of 10,000 inhabitants or over.
- (d) School inspection with a school nurse, and open-air schools and fresh-air rooms for children.
- (e) A proper system of factory inspection with a nurse to assist.
- (f) Adequate ways and means to educate the medical profession in the early diagnosis of tuberculosis, and the general public concerning its frequency, methods of avoiding contracting tuberculosis, and especially its prevention.

CHAPTER VII.

GASTRO-INTESTINAL DISORDERS.

GASTRIC AND DUODENAL ULCER.

INDICATIONS FOR MEDICAL TREATMENT.

1. Recent ulcers.
2. Chronic ulcers with mild symptoms.
3. Chronic ulcers which have not had satisfactory medical treatment.
4. Ulcers for which surgical treatment is too dangerous or has been refused.
5. As a preparation for operation.

The prognosis under medical treatment is better the more recent the ulcer.

PRINCIPLES OF TREATMENT.

The principles and methods are essentially the same whether the ulcer is in the stomach or in the duodenum.

1. Prolonged rest for the patient and for the digestive tract.
2. Avoidance of food mechanically or chemically irritating.
3. Reduction of gastric secretion to the minimum.
4. Good care of teeth.

METHODS.

A. Rest for a month or more is essential.

B. Diet should consist chiefly of soft carbohydrates, fats, milk, and eggs. Feeding should be frequent.

Treatment may be begun by starvation for several days, if the stomach be very irritable. Nutritive enemata are seldom, if ever, of much value because they are not well absorbed. During the period of starvation three pints of salt solution should be given daily by rectum. Cracked ice may be sucked to allay thirst.

Begin feeding with small quantities of milk (see Vomiting, p. 223). Later, bread, or crackers and milk, milk toast, strained cereals with cream and sugar, rice, custard, blancmange, junket, simple ice cream, mashed or baked potato with cream or butter,

eggnog, raw or soft boiled or dropped egg, pursee, soft fruits, etc., can be added later to the dietary until the patient is taking ample nourishment.

The nutritive value of liquids can be much increased by adding to them sugar of milk, fr. $\frac{1}{2}$ to 1 oz. if 4 oz. (or fr. 15 to 30 gm. in 120 mils.) of liquid. Cream may be added to milk, and butter should be used freely.

Irritating foods, e.g., coarse vegetables, condiments, acids, and particularly alcohol must be avoided.

Hot drinks and meat broths, as a rule, should not be taken.

Proteid foods, in the opinion of the writer, are to be avoided, as a rule, except in the form of milk or eggs.

C. Modification of diet is required for patients that are emaciated, or feeble and anemic. For them starvation may be harmful, and it may be wise to begin feeding by mouth soon after the hemorrhage has stopped, and quickly to increase the amount of food ingested in order to accelerate healing by improved nutrition. The experience of the patient with the peculiarities of his digestion requires consideration.

In marked contrast to those expressed above are the views held by some physicians who advocate a diet consisting chiefly of proteid. Their aim by means of proteid is to neutralize the acid secretion as fast as formed. Frequent feedings are recommended with the same object.

Lenhardt is one of these, and his method may be preferred for some cases. His diet schedule follows, p. 219.

D. Reduction of gastric secretion * may be favored by starvation, by a diet low in proteid, by the avoidance of salt and by the administration of $\frac{1}{2}$ to 1 tablespoonful of olive oil several times daily.

E. Medication:

1. Sodium bicarbonate † should be prescribed freely for relief of pain or distress in the dose of $\frac{1}{2}$ to 1 teaspoonful, or more if required, in a glass of water. A hot water bag may relieve.

2. After feeding has been begun bismuth subnitrate should be given three times daily in teaspoonful doses *before* meals with

* Small doses of atropine are recommended by some physicians.

† Magnesium oxide is preferred by some physicians.

the hope of benefit by coating the ulcer mechanically. Bismuth is not constipating in this dose. It is important that the drug should be pure.*

3. The bowels should be kept free by enema or by mild cathartics. Milk of magnesia acts well as a mild cathartic and also as an antacid.

D. Convalescence:

1. General hygienic measures including attention to the bowels are important.

2. Work should be resumed gradually and much fatigue, psychical more than physical, should be avoided.

3. Rest, lying down, for from $\frac{1}{2}$ to 1 hour after meals is of great benefit.

4. Food should be taken in the middle of the morning, the middle of the afternoon and at bedtime in addition to regular meals.

5. The more strictly the diet and regimen can be followed the greater the chance of success but it is better to enlarge the dietary than to undernourish the patient because good nutrition favors healing of the ulcer. The treatment should be followed as strictly as practicable for from six months to a year.

COMPLICATIONS: TREATMENT.

A. Hemorrhages, when small, require no special treatment.

When a severe hemorrhage occurs the patient should lie as still as possible and morphine should be given subcutaneously in dosage sufficient to bring the patient well under its influence and to inhibit peristalsis (p. 271). Further medication is not likely to do good.

An ice-bag may be placed over the stomach.

Stimulation of the circulation by salt solution, by transfusion of blood, or by drugs should be withheld unless demanded by immediate danger, because raising the blood-pressure may prolong the hemorrhage.

If syncope be feared after hemorrhage it may be advisable to raise the foot of the bed.

* Squibb's is good for this purpose.

Operation is seldom indicated during hemorrhage because most hemorrhages stop spontaneously, and because when the patient has become exsanguinated operation is dangerous.

Repeated hemorrhage is an indication for operation after the patient has recovered sufficiently from the resulting anemia. Transfusion may be advised to hasten recovery or to prepare for subsequent operation.

B. Perforation may be acute or subacute. It may lead to general peritonitis, to abscess, or to adhesions causing persistent, severe symptoms.

The acute perforations and those with abscess formation should receive prompt surgical treatment. Early diagnosis is very important.

C. Pyloric obstruction, when severe, requires operation. Incomplete obstruction with gastric dilatation can often be relieved temporarily and sometimes for long periods by rest in bed, lavage daily before breakfast, and a soft diet with limited liquids. Under such treatment the dilated stomach may contract and acute inflammation at the pylorus may subside.

This is an excellent preparation for operation. Operation should be urged early for pyloric obstruction because when symptoms make it imperative the weakened condition of the patient adds greatly to the risk.

D. Persistent severe symptoms which do not yield to medical treatment demand that operation be seriously considered.

LENHARTZ DIET *

Days after hemorrhage	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of eggs.....	2	3	4	5	6	7	8	8	8	8	8	8	8	8
Sugar with egg.....														
Milk †.....	200	300	400	500	600	700	800	900	1000	1000	1000	1000	1000	50 gm.
Raw mince ‡.....	.....	.....	.....	.....	.....	35	2X35	2X35	etc.	200	200	300	300	1000 c.c.
Milk rice.....	.....	.....	.....	.....	.....	100	100	100	etc.	40	40	60	60	gm.
Zwieback.....	.....	.....	.....	.....	.....	.....	.....	.....	etc.	40	40	60	60	400 gm.
Raw ham ‡.....	.....	.....	.....	.....	.....	.....	.....	.....	etc.	50	50	50	50	50 gm.
Butter.....	.....	.....	.....	.....	.....	.....	.....	.....	etc.	20	20	40	40	gm.
Calories.....	280	420	637	777	955	1135	1588	1721	2138	2478	2941	2941	3007	3073

* Ref. Wagner. Munich-Med. Woch., 1904, page 1.

† Administer in spoonfuls, iced.
‡ Cooked mince-meat or tender roast meat would be preferred by most non-Teutonic patients and physicians.

ACUTE INDIGESTION

Pathology: Probably irritation, with hyperemia, and possibly with inflammation of the mucous membrane of the stomach, of the intestines or of both.

Etiology: 1. Ingestion of food unwholesome either in itself or for the individual.

2. Excess of food.

3. Excess of alcohol or other beverage.

Diagnosis of indigestion is made by history and by exclusion.

Do not overlook the following diseases which may cause vomiting:

- | | |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 1. Acute infectious diseases
including malaria. | 8. Brain tumor. |
| 2. Nephritis. | 9. Tabes dorsalis. |
| 3. Pregnancy. | 10. Angina pectoris. |
| 4. Migraine. | 11. Chronic gastric or intestinal
diseases. |
| 5. Lead colic. | 12. Acute surgical conditions,
<i>e.g.</i> , appendicitis, chole-
cystitis, renal colic, etc. |
| 6. Hysteria. | |
| 7. Acute drug poisoning. | |

PRINCIPLES OF TREATMENT

1. Rest and warmth for patient.
2. Removal of cause of symptoms.
3. Rest for digestive tract.
4. Symptomatic treatment.

METHODS.

Methods must be chosen with regard to the cause, severity and nature of symptoms.

1. Rest and Warmth. The patient should lie down and should be warmly covered or should remain in bed. Hot-water bags may be useful for cold extremities or for abdominal distress or pain. Rest and warmth diminish metabolic waste and promote recuperation.

2. Removal of Cause. If the distress is gastric, and if the stomach has not been freely emptied, emesis may be induced by administering quantities of warm water or by means of a tea-spoonful of mustard-powder mixed in a cup of warm water.

If symptoms come from the intestine the bowel should be evacuated unless profuse diarrhea has cleared it thoroughly. A saline cathartic, or calomel followed by a saline cathartic, may be of service if the stomach can retain it. An enema may be given at any time for prompt effect or if cathartics cannot be retained. Both emesis and catharsis are necessary for some severe cases.

3. Rest for Digestive Tract. Well-nourished patients generally do best without food of any kind for from 12 to 24 hours. Plain water or mineral water may be allowed in small quantities at short intervals.

When beginning to feed it is wise to use liquids, such as beef tea, chicken broth, hot milk or orange juice, a few ounces, every two hours. The nourishment should be increased in amount and in kind more or less rapidly according to the physician's estimate of the patient's digestive capacity. Hunger and a clean tongue generally indicate that considerable quantities of food can be assimilated; whereas a coated tongue and disgust for food mean the reverse.

6. Symptomatic Treatment.

(a) **Nausea** generally yields to rest and abstinence from food.

Emesis is advisable for some cases.

(b) **Vomiting** usually stops spontaneously when the stomach has been emptied. If it does not yield to rest and abstinence from food it may be checked sometimes by a teaspoonful of shaved ice with brandy, by a drop of Tr. of iodine in a teaspoonful of water, by $\frac{1}{4}$ gr. (or 0.016 gm.) of cocaine hydrochloride dissolved in a teaspoonful of water, by $\frac{1}{8}$ gr. (or 0.008 gm.) of morphine sulphate absorbed from the mouth, by other drugs, or by gastric lavage. Food should be withheld entirely for from about 3 to 12 hours after vomiting has ceased. Water should be allowed during this period in very small amounts if at all. Cracked ice may be sucked for thirst.

When gastric disturbance lasts over a period of days, salt solution must be administered in the form of enemas, by rectal seepage or by hypodermoclysis. Three pints in 24 hours is enough. These measures and rectal feeding are very rarely needed in acute gastritis.

Feeding should be resumed cautiously, using milk diluted with mineral-water, lime-water, or carbonated water; or orange juice, or broth in teaspoonfuls every half hour. The quantity of nourishment should be increased and the intervals between feedings lengthened gradually.

- (c) Diarrhea should not be checked until all old fecal matter has been discharged. If the diarrhea persists in a mild form a few doses of about 15 grs. (or 1 gm.) of bismuth subnitrate may suffice to stop it. When diarrhea is severe opiates are often required. A tea-spoonful of paregoric may be prescribed after each loose movement. Morphine may be required subcutaneously. For other medicaments see below.
- (d) Colic can be checked, when slight, by the application of heat to the abdomen and by rest and abstinence from food.

Paregoric or other preparations of opium or morphine may be used for severe pain but they are contraindicated in full dosage until the intestinal tract has been cleared, and also when conditions which may require surgical interference cannot be ruled out.

SIMPLE DIARRHEA.

DIAGNOSIS.

Do not overlook the following diseases which may cause diarrhea.

1. Dysentery, bacillary or amebic.
2. Other infectious diseases, *e.g.*, typhoid.
3. Nephritis with colitis.
4. Carcinoma of lower bowel.
5. Fecal impaction with intermittent diarrhea.
6. Rectal diseases with tenesmus.
7. Mucous colitis.
8. Reflex or nervous diarrhea, *e.g.*, due to chill, exophthalmic goitre, or perhaps to anxiety.
9. Habitual excess in eating and insufficient exercise.
10. Irritating ingesta or imperfectly digested food.

PRINCIPLES OF TREATMENT.

Suit methods to severity, duration and persistence of symptoms:

- (a) Remove irritant, usually imperfectly digested food.
- (b) By means of a suitable diet avoid further irritation.
- (c) Limit peristalsis.
- (d) When there is toxemia, dilution and elimination of toxins is important.

METHODS.

A. To Remove Irritant. Unless bowel has been thoroughly evacuated prescribe a purge which will act quickly and ascertain that this result has been obtained before proceeding to other kinds of medication.

A saline, or castor oil, may be used. If these are vomited an enema may do good. It may be advisable to induce emesis.

Calomel generally acts well (p. 295).

B. The Diet should be non-irritating; should leave little residue; and, preferably, should be digested high up.

Eggs, broths and lean meats are well digested as a rule.

Starches containing little cellulose may be preferred occasionally.

Fats, fruits and coarse vegetables in general are to be avoided.

Liquids should be bland and not cold.

C. To limit peristalsis. (a) Rest, preferably in bed.

(b) Restriction of ingesta. Meals should be small and frequent. In severe conditions of short duration food and liquids may be forbidden entirely for a time. The length of time depends on the state of nutrition and tolerance of the patient.

(c) Warmth, externally and internally, *i.e.*, a warm room, avoidance of changes of temperature, a hot-water bag on abdomen and hot drinks.

MEDICATION.

(a) *Astringents.* Bismuth subnitrate, fr. 10 to 20 grs. (or 0.65 to 1.3 gm.) every 2 to 8 hours.

Acidum tannicum (U. S.), boiled green tea, red wine, or Tan-nalbin † may be tried.

(b) *Sedatives.* Opiates are best, *e.g.* Tr. opii camphorata

(U. S.) "Paregoric," or Tr. opii deodorati (U. S.), or Misturæ contra diarrhœam (N. F. 3d ed.) as "Cholera mixture," "Squibb's Diarrhœa Mixture," and others, or "C. O. T. pill" † containing Camphor 1 gr. (or 0.065 gm.), Opium $\frac{1}{4}$ gr. (or 0.016 gm.), and Tannic acid 2 grs. (or 0.13 gm.).

CONSTIPATION.

Constipation is a symptom seen in many diseases, some functional, some organic. The treatment should combat the cause or causes in the individual case. Hence, a clear understanding of every case is of prime importance.

CLASSIFICATION OF CONSTIPATION.

I. Spasmodic Form: 90 per cent of all cases.

- (a) Mucous colitis.
- (b) Neurasthenia.
- (c) Lead poisoning.
- (d) Intra-abdominal or pelvic inflammation.
- (e) Fissure of anus.

II. Atonic Form.

Muscular weakness or general debility due to:

1. Fevers.
2. Anemia.
3. Cachexia.
4. Senile debility.

III. Obstructive Form.

- (a) Stricture.
- (b) Adhesions.
- (c) Pressure from tumor or pregnancy.
- (d) Ptosis with kink.
- (e) Acute obstruction.

IV. Less common varieties of constipation are excluded from lack of space.

Diagnosis of stricture, adhesions and ptosis or kink can seldom be made satisfactorily without bismuth x-rays, but x-ray evidence is often misleading.

† Not official.

PRINCIPLES OF TREATMENT.

A. The essential causes of chronic constipation are *bad hygiene*, *neurasthenia*, or a combination of both. Therefore it is often imperative to encourage the patient as well as to correct his habits.

B. Clear the intestinal tract thoroughly and keep it clear, including the rectum cecum.

C. Soothe or stimulate the bowel by suitable diet as required.

E. Use cathartics sparingly or not at all, and avoid undue irritation of the bowel by them.

F. Prescribe sufficient liquid in definite quantity.

G. Enjoin proper mastication of food and prescribe false teeth if needed.

H. Instruct patient about regularity in defecation.

I. Exercise or abdominal massage, unless contraindicated, may help sedentary persons.

SPASMODIC CONSTIPATION.

Note.—Spasm of the colon, particularly marked in the region of the hepatic flexure, is very commonly shown by the X-ray in cases of constipation. The cause of this spasm is not obvious but personal observation has led me to believe that it represents, in many cases, a response to irritation. The source of the irritation may perhaps be improperly digested food or retained sciballae. Whatever the cause, many of these cases show abnormal sensitivity to deep pressure in the region of the cecum, the sigmoid or the transverse colon and many are operated upon for "chronic appendicitis." The relief following the operation is generally transient and much harm may result.

Mucous colitis seems to be a more advanced stage of the condition outlined above. Neurasthenic symptoms are prominent in this stage but are often in evidence much earlier if not from the beginning.

Proceeding on the basis of the theory above outlined, the following procedure was evolved and has proved its value:

Methods.

(1) Clear the bowel thoroughly using oil enemata and irrigations in more severe cases of long standing and castor oil or calomel in milder cases.

(2) Restrict diet markedly both in quantity and quality for the first week in order to rest the bowel, avoiding anything which might act as an irritant to it, *e.g.* foods rich in cellulose, acids, spices, tea, coffee and alcoholic beverages.

The following list of suitable foods is not complete, and should not be followed too closely in all cases. The experience of the patient may be valuable. Fresh milk, cream, butter, sugar, rice, macaroni, sago, tapioca, strained oatmeal, cream of wheat, white bread or toast, potato, baked, boiled or mashed, junket, custard, blanc-mange, eggs, boiled, poached, scrambled or stirred, finely minced chicken or lamb, boiled tongue, or tender steak if it can be well chewed.

(3) After the first week and until abdominal sensitiveness has disappeared the non-irritating diet should be continued in quantity sufficient to maintain weight and variety should be secured by adding to the list from time to time.

(4) Action of the bowels during this period may require the daily use of an enema but agar or Russian oil (p. 297) should be given and may suffice. Cathartics which act by virtue of their irritating qualities are to be scrupulously avoided.

(5) Gradual return to a normal diet rich in cellulose and fruit should follow the disappearance of abdominal sensitiveness.

(6) General hygienic measures are very important.

Exercises designed to improve posture and to strengthen the abdominal muscles may be required and massage of the cecum and colon may be helpful.

Lead Poisoning with Constipation. Antispasmodic medication with morphine or atropine is required.

Intra-abdominal or Pelvic Inflammation or Fissure of the Anus may cause constipation by reflex spasm. Treatment demands removal of the cause by appropriate means.

METHODS FOR ATONIC CONSTIPATION.

Post-febrile constipation, being transient, may be treated with mild laxatives for convenience.

Constipation in Anemia, Cachexia, or Senile Debility. The patient's convenience should be considered, especially in ambulatory cases, or when the chance of ultimate cure is small. *Nux*

vomica may be of service, and mild laxatives, glycerine suppositories, or enemata may be advised according to circumstances. Fecal impaction should be guarded against and water catharsis must be avoided. Massage may do good and mechanical support may aid defecation when the abdominal wall is weak.

A diet, rich in cellulose, fruits, and sugar, may help to stimulate peristalsis. Graham bread, oatmeal, cracked wheat, green vegetables, beets, carrots, turnips, tomatoes, raw or stewed fruits and jams are particularly to be recommended for those who can digest them.

METHODS OF TREATMENT FOR OBSTRUCTIVE CONSTIPATION.

(a) **Stricture.** Operation will generally be required. Palliation by means of "Russian Oil" by mouth, or by rectal injections of oil followed by cleansing enemata may be beneficial.

(b) **Adhesions.** The palliative measures just mentioned may suffice. Exercise or massage may do good. Operation may be advisable.

(c) **Pressure.** Palliate or operate according to circumstances.

(d) **Ptosis.** A suitable abdominal supporter may relieve. Other palliative measures and exercise or massage may help. Operation offers little hope of relief, as a rule.

(e) **Acute Obstruction.** Prompt operation is imperative.

METHODS USEFUL IN VARIOUS KINDS OF CONSTIPATION.

I. **Massage** daily may be very beneficial.

"**Cannon-ball Massage.**" A heavy ball is necessary. A 12- or 16-lb. "shot" (made for athletics) and covered with leather or strong cloth will serve. Once or twice daily the patient, lying on his back, should roll the shot repeatedly around the abdomen* from the cecum along the course of the colon for 15 minutes before going to the toilet.

II. **Enemata.** (a) In long-continued constipation the rectum may never empty itself completely ("dyschezia"). As a result the reflex to defecation may be lost. This reflex can sometimes be regained after a course of oil injections at night, followed by

* The abdominal muscles should be relaxed while the ball is being rolled.

cleansing enemata in the morning. Olive or linseed oil is suitable. From 4 to 6 oz. (or 120 to 180 mils.) should be used at each injection and the oil should be retained through the night.

(b) Cleansing enemata of warm water with the addition of Sod. bicarb. or of salt 1 drach. (4.0 gm.) to the pint (500 mils.) can be used when irritation of the mucous membrane is to be avoided.

(c) Cold water, hot water, or soap suds and water are more potent than salt solution or warm water.

(d) Strong enemata, consisting of glycerine fr. 1 drach. to 1 oz. (4 to 30 mils.); or of Sat. sol. of Mag. sulph., glycerine, and water $\overline{\text{aa}}$ 2 oz. (or 60 mils.) can be used if required.

III. Laxatives should be used only in conjunction with suitable diet, abundant liquid (6 to 8 glasses of water daily) and hygienic habits. No one laxative suits all persons.

(a) Fl. Ext. of Cascara sagrada can be used in doses of 10 or 15 min. (or 0.6 to 1 mils.), after meals, or in a single dose of 10 min. to 30 min. (or 0.6 to 2 mils.) at bed-time. When regularity of the bowels has been established the dose of Cascara can be diminished drop by drop until medicine is no longer required.

(b) Prunes and Senna. Instruct patient to stew 3 dozen prunes with two tablespoonfuls of Senna leaves (enclose leaves in a cheese-cloth bag), and to eat 10 prunes once or twice daily. When the bowels have been regular for a time the amount of Senna can be reduced until prunes only are taken. Later, the number of prunes can be reduced.

(c) Russian Oil or Agar-agar (p. 299) may be tried. They act mechanically and do not irritate the intestines.

CHAPTER VIII.

DIABETES MELLITUS.

BY B. HARRISON RAGLE, M.D.

Recent research and advance in the treatment of diabetes lead us to conclude that it is much to the patient's advantage to have his urine rendered sugar-free and to keep it sugar-free. Nor is this quite enough. The blood-sugar and blood-fat levels * should be established because with this additional data to guide, both physician and patient are less likely to go astray. When, therefore, the diabetic person presents himself we have in mind the following several principles of procedure:

PRINCIPLES OF TREATMENT.

- A.* Render the patient's urine free from sugar.
- B.* Reduce the blood-sugar and blood-fat to the normal, if possible and practicable.
- C.* Establish a proper diet to accord with need or up to tolerance.
- D.* Give the patient as thorough an understanding of the dietary as advisable and teach him to do the simple qualitative test on his own urine.
- E.* Rearrange the habits of living to conform with the diet.
- F.* See that all functions and organs are kept in the best possible condition.

METHODS OF TREATMENT.

- A.* To render the urine sugar-free it is desirable to have the patient under close supervision in order intelligently and safely to limit his diet or to fast him. It is quite essential to understand the patient's temperament and to learn the probable cause and duration of the disease. The outcome of previous attempts at treatment, and the knowledge of the condition of the organs often

* It is rather doubtful whether figures for blood-fat are important. During the past two years little information of value has been drawn from approximately 1000 estimations. On the other hand, blood-sugar estimations are constantly assuming greater importance.

give fairly precise information as to the possibilities in a given individual. Unless there is need for haste, a more or less gradual reduction of the diet is preferable to the fasting treatment. The following procedure is safe, even in the most severe cases:

1. Elimination of fat from the diet in practically every case will clear up an existing acidosis or make such a development less likely.

2. A test diet may be worked out and applied to every patient, or the dietary may be adjusted with discretion to the patient concerned. Ordinarily, a diet consisting of one gram of carbohydrate and one gram of protein per kilogram of body weight, continued for a day or two, orients us definitely as regards the severity of the case in hand.

B. Usually the urine becomes sugar-free on the above diet and simultaneously the blood-sugar and blood-fat drop to normal. In more severe cases in which this latter does not occur the carbohydrate should be completely eliminated from the diet for a day.

C. When the blood figures have reached a low or normal level five grams of carbohydrate, five of protein, and five of fat may be added daily to the diet until the protein has reached a gram, or a gram and one-half per kilogram of body weight. The carbohydrate and fat should be further increased until the maintenance * diet is reached, the tolerance is reached, as indicated by the appearance of sugar in the urine, or when the blood-sugar begins to rise above normal.

The final diet should establish nitrogen equilibrium (practically determined when loss of weight ceases) and should be so balanced that the intakes of carbohydrate, protein, and fat are approximately the same for each meal. By such careful measures the body will not be flooded at any one period above its metabolic capacity.

D. During this period of dietary adjustment the patient should watch his charts daily and, if possible, figure out for himself the calories the diet contains. Simultaneously, he should be taught the value of testing a complete twenty-four hour specimen of urine and should learn to use Benedict's Solution as well as the gram-scales with which he will from time to time or at stated intervals

* A "maintenance diet" is one just sufficient to maintain body-weight at the desired level taking into consideration the circumstances and occupation of the patient.

weigh his food in order to become conversant with approximate weights.

E. When the diet has reached a level which will give him sufficient food, or has reached that level at which it is advisable to let it remain, the patient should be made to see the reason for particularly strict adherence. Then, before discharging him from immediate supervision, he must be taught that on a restricted diet his activities must be limited in order to accord with the diet. The failure on our part to make him realize that he has a limited tolerance for activity, or the failure on his part to pursue the regimen laid out for him, leads him all too often into immediate difficulty (viz. a patient whose diet yields 1500 calories may remain at his business six hours and take a two mile walk and find that he has lost no weight and that his general muscular tone at the end of a month is quite as good as ever. The second month he may unwittingly lengthen his business hours and increase his exercise only to find at the end of a month, much to his chagrin, that he has lost five pounds). Especially in the thin diabetic it is our duty to guard against loss of weight whenever possible. At the same time we must realize that almost all of the most successful patients are those who have slowly lost weight considerably below a recognized fixed standard, jealously keeping during this period their muscle tone by exercise.

There is an occasional person in whom a knowledge of his daily progress creates such mental disturbance that it is advisable to put the care of his case in the hands of a discrete relative or nurse.

A proper attitude or a proper philosophical acceptance of his limitations is often quite as important to the patient as establishing a diet along the most scientific lines.

F. During the glycosuric period, the diabetic organism becomes much less resistant to the pyogenic and other infections, and convalesces slowly after injury.* Therefore, we should investigate the respiratory, circulatory, and gastro-intestinal systems and endeavor to correct any disorders that are found. Acute visual disturbances usually clear up when the urine becomes sugar-free, but, inasmuch as good vision becomes a more valuable asset in a person whose activities and diversions are limited,

* During aglycosuric periods the diabetic with no other organic disturbance is seemingly peculiarly free from ordinary infections.

glasses should be ordered or corrected as indicated. The teeth and gums should *always* be examined carefully because dental sepsis has all too often been a serious factor in retarding the progress of a patient.

FASTING TREATMENT.

Contraindications to fasting:

- (a) Existing acidosis.
- (b) Infection, with fever, or toxemia.
- (c) An organic complication † in an untreated diabetic on a full diet whose output of sugar is large.

The fasting procedure is applied with safety only in the hands of the expert. It is likely that he will only fast the mild, uncomplicated diabetic. When used with discretion this method saves a little time. It is rarely wise to starve a diabetic more than three days. If the urine is not sugar-free at the end of this time, three days on a diet moderately high in protein and low in fat and carbohydrate followed by a two-day fast will prove sufficient to render the urine sugar-free.

ACIDOSIS.

As has been stated above, mild acidosis practically always disappears when fat is reduced or eliminated from the diet. If the acidosis is severe and does not quickly respond to this treatment it is because the alkali reserve of the body has been considerably diminished. Therefore, we should treat as for impending coma, as follows:

- (a) Bed-warmth.
- (b) Enema (repeated if necessary) to empty and cleanse the colon.
- (c) Fluids: Water, hot diabetic broths,* tea and weak coffee (300 cubic centimeters every hour for four hours, and 200 cubic centimeters every hour thereafter).
- (d) Nourishment: Endeavor to get the patient to take 50 to 100 grams of carbohydrate in the form of orange juice or hot oatmeal gruel (30 grams of oatmeal to 500 cubic centimeters of water).

† e. g. a serious cardiac, or renal lesion, a recent trauma, surgical or otherwise.

* A "diabetic broth" may be made from meat or clams and if from the former the fat should be skimmed off.

If coma is really impending and the patient not able to take nourishment, or so nauseated that he cannot retain it, resort at once to 500 cubic centimeters of warm, freshly prepared normal salt solution intravenously. Administer also hot rectal saline or hot clear broth.

(e) **Stimulants:** Little success has attended the use of strychnine or caffeine. The latter may be administered, however, in the form of black coffee. It is probably advantageous as a diuretic, and surely beneficial in so far as it increases the intake of fluid. In practically all cases of impending coma the cardiac muscle is much weakened. Therefore, digitalis should always be administered, preferably intravenously or intramuscularly.

(f) It is desirable to avoid the use of alkalis. A properly treated case will rarely have a depleted alkali reserve, but there are the neglected cases in which temporary use of alkali is indicated. Twenty-five grams of sodium bicarbonate may be taken daily until the blood-bicarbonate becomes normal or the urine becomes alkaline or unless by such treatment the patient becomes nauseated. The very severe diabetic who runs along month after month on a much restricted diet usually has a low blood-bicarbonate. Such a case will benefit by an occasional short course of alkali. (Sodium Bicarbonate should be given until the urine becomes alkaline). Once extolled in impending coma, the value of alkali is now questioned in this condition.

COMPLICATIONS IN DIABETES.

1. INFECTIONS.
2. FURUNCLES AND SEPSIS.
3. GANGRENE.
4. NEPHRITIS.
5. PREGNANCY IN DIABETES.

1. **Acute Infections** in the diabetic, even when mild, are always serious unless handled skilfully, because all the symptoms met with in fulminating diabetes may appear. The patient should be treated as is required for the acute infection but with the diet so regulated that no acidosis will occur and with as little glycosuria as is possible. In giving instructions to a diabetic patient, it is

often wise to advise him that in the event of an acute infection such as tonsillitis the fats should be omitted from the diet and the carbohydrates halved until he obtains further advice from his physician.

2. Furuncles and Sepsis. To avoid these complications by permitting no glycosuria or hyperglycemia is much simpler than to cure them. Bruises and abrasions should be treated with utmost care. Infections are less likely to occur when the urine is sugar-free and the blood-sugar at a low figure.

3. Gangrene. Avoidance of this difficulty is possible. To our elderly patients with endarteritis obliterans should be emphasized the wisdom of careful trimming or filing of the toe nails. Woolen socks, warm foot baths, massage, leg and foot manipulation, and short walks should be prescribed.

4. Nephritis is no contraindication to the usual diabetic procedure in the dietary. Careful adjustment of the diet and habits of life often leads to definite improvement of both above mentioned conditions. By giving a limited but necessary amount of protein and by restriction of the intake of salt and liquid, non-diabetic edema can be relieved should it occur.

5. Pregnancy in Diabetes. Pregnancy in a real diabetic is always serious and requires the utmost skill in management. Cooperation between the obstetrician and the physician taking care of the diabetic situation is necessary at all times.

ETIOLOGY OF DIABETES.

1. INFECTIONS — TOXEMIAS.
2. OBESITY.
3. MENOPAUSE
4. ARTERIOSCLEROSIS.
5. HEREDITY.
6. PROLONGED GREAT EXCESS OF SWEETS.
7. MENTAL WORRY AND ANXIETY.
8. HYPERTHYROIDISM — ENTEROPTOSIS.

I believe that infection is the principal cause of most cases of diabetes. For example, it is as reasonable to expect a pancreatitis as a nephritis following a septic sore throat. Not infrequently

slight glycosuria is noted simultaneously with temporary kidney irritation. Both may clear up temporarily but many repetitions of infection may lead eventually to chronic nephritis or to diabetes.

2. Just as an obese person becomes the victim of cardiac or of kidney disease because of the excessive burden of fifty or seventy-five extra pounds, he may find himself a victim of diabetes. No type of diabetic responds so regularly to present day treatment as the fat diabetic. Automatically, with the removal of the burden, the organism recuperates and with wise adherence to the regimen little difficulty is encountered.

3. A disturbance in any function may occur during the menopause. Such parenchymatous changes as we see in the kidney may also occur in the organ or organs that have to do with the development of glycosuria. The onset of diabetes during this period is so frequent that it is a wise precaution to have medical supervision at this time.

4. Just as atherosclerosis lowers the function of the kidney, so also may it lower the function of the organ or organs that have to do with diabetes.

5. Erroneous training permitting self indulgence particularly in those things that favor glycosuria, may be behind the hereditary factor.

6. Prolonged indulgence in sweets is too often a part of the diabetic's history to be ignored completely as a factor in etiology.

7. Most authorities lay emphasis on the part played by mental worry and anxiety. Probably it is often a factor in etiology, but most surely it is a large factor in hastening the progress of the disease once established.

8. Sugar is known to occur frequently in the urine of patients with exophthalmic goiter and occasionally in that of enteroptotics. Neither condition has been proven to be important in the etiology.

DIABETES IN CHILDREN.

The prognosis, though unfavorable, is not so hopeless as it was a few years ago. Leading authorities agree that the best results are obtained and the child's life prolonged by rigorous adherence to the principles of keeping the urine sugar-free.

TRANSITORY GLYCOSURIA.

It is safest and wisest to consider every person excreting any amount of sugar as a diabetic until proven otherwise. The burden of proof rests with the physician, and I am always reluctant to take the responsibility of making the diagnosis of temporary glycosuria. Every such case is a potential diabetic.

RENAL DIABETES.

So-called renal diabetes exists, but is rare. A great responsibility rests on the physician who, without the most careful study, classifies any individual in this group.

EXCEPTIONAL DIABETES.

There is an irregular type of diabetes, the time of onset of which can usually be traced to middle age. The disease goes on for many years without causing serious symptoms, and this class of individual may experience no handicap that he considers unassociated with oncoming age until there takes place a fairly rapid loss of weight and strength, accompanied by moderate increase of thirst, appetite and frequency of micturition. An injury, sepsis, or an acute infection may be the cause of this fairly rapid decline.

It is not unlikely that this group comprises the majority of those diabetics who, late in life, suffer from carbuncles and gangrene. The latter trouble is probably the result of a marked arteriosclerosis which is almost invariably present. The basis of their glycosuria may be arteriosclerosis of some of the vessels of the pancreas analogous to the changes of this character which occur so commonly in the kidney with advancing years.

The best method of treating these patients is still in doubt; but it is probably wise to impose only moderate restriction of diet.

NOTES.

No satisfactory classification of diabetic conditions has yet been produced.

For accurate observation and careful adjustment of a regimen, early institutional treatment for the patient is desirable except in

those cases where the general condition and temperament of the individual calls for a thoroughly experienced nurse capable of carrying out treatment in the home, or when the wife or house-keeper can carefully observe every detail and eventually take over this responsibility. Not infrequently when the patient must depend upon himself his condition preys upon his mind to such an extent as to seriously interfere with his equanimity.

Accurate quantitative determination of the degree of acidosis can be made simple by means of the Van Slyke, the Frederica, or the Marriott apparatus.

It is important in diabetes to keep the skin in good condition. For this purpose frequent warm baths and occasional massage with cocoa butter or lanolin cream are beneficial.

Exercise should be insisted upon for diabetics and in many cases it should be taken immediately after meals. The kind and amount required can be learned by watching the effects.

The patient whose activities are limited and who has much spare time will benefit by finding a hobby or diversion such as wood carving, whittling toys, or knitting.

Alcohol is no longer used either as a food or as a therapeutic measure for acidosis in diabetes.

Surgery can be performed on diabetics with proper precautions.

Local anesthesia should be used whenever possible to the exclusion of all other anesthesia. Anesthesia by ether or chloroform is contraindicated.

Gas and oxygen in the hands of a skilled anesthetist is satisfactory. Spinal anesthesia may be used.

Early restriction of salt in all cases seems advantageous.

A vegetable day or half-day weekly is beneficial in the severe or moderately severe cases when the blood-sugar remains near the danger mark.

A fatless day each week is prescribed for patients whose blood-fat tends to creep above the normal.

The patient should dress warmly.

Saccharine may be permitted up to 3 grains daily but should ordinarily be discouraged.

CHAPTER IX.

MEDICATION.

FOREWORD.

He who masters the use of a few good drugs will succeed better than he who tries many at random.

Before prescribing a drug, let the indications for its use be clear.

Prescribe drugs singly when expedient.

Ascertain whether an idiosyncrasy to the drug you wish to prescribe is known to the patient.

When a drug has been given, watch for its good or for its toxic effect. Increase dose until the one or the other is apparent. If neither results, change either the preparation or the drug.

If toxic effects occur, omit the drug for a time and resume it later in smaller dosage or try a substitute.

EXPLANATION.

The purpose of the list which follows is to indicate the important drugs and the preparation of each believed to be the most generally useful. The dosage recommended is suitable for the average adult and may require modification for the individual.

Much useful information is contained in the "United States Dispensatory." It describes the drugs of the principal pharmacopœias, the preparations of the "National Formulary," and many unofficial preparations. "New and Non-official Remedies" gives information about many proprietary drugs. The writer's information about patents and trademarks was derived from this book. It is published yearly by the American Medical Association.

LIST I.

VERY VALUABLE DRUGS.

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SYNOPSIS OF LIST I.

I. ARSPHENAMINE.*

Action. Kills certain pathogenic organisms in the living body. It may irritate the kidneys or liver but seems to have no toxic effect *per se* for other organs.

Elimination. Excretion rapid, chiefly in urine and feces. When the excretory organs act normally, most of the drug is eliminated on the first day and nearly all within three or four days after an intravenous injection.

Toxic effects. 1. Signs of renal irritation or diminution of kidney function.

2. Jaundice.

3. Erythema.

4. Hyperemia and swelling at the site of syphilitic lesions; *i.e.*, "Herxheimer reaction." To this group probably belong many of the dangerous symptoms arising within three days of the injection. Among them may be mentioned headache, vomiting, earache, syncope, convulsions and coma.

5. Fever developing gradually after a day or two may result from rapid destruction of spirochætae.

Accidents or errors which may cause severe symptoms or death:

1. The "water-error," *i.e.*, contamination of the distilled water (used for solution) with bacteria living or dead; or with chemical impurities from the distilling apparatus. Symptoms that have

* Not official.

been attributed to water-error are rigor, rapid rise in temperature, gastro-enteric disturbances, etc. It seems probable that some of these symptoms are more often due to other causes, e.g., over-dosage.

2. Impurity of NaCl or of NaOH used in the solution.
3. Oxidation of the Arsphenamine may be followed by signs of arsenical poisoning, gastro-enteric disturbance, peripheral neuritis, paraplegia, etc.
4. Accidental use of an acid instead of an alkaline solution. The former is 10 times more toxic than the latter.
5. Errors in technic of injection may result in venous thrombosis and pulmonary embolism.
6. Use of the drug in unsuitable cases.
7. Lack of preparation, or of after-care of the patient.
8. Excessive dosage for the individual under existing circumstances, or too early repetition of dose.
9. Combined effect of various factors above mentioned.
10. Neurorecurrence appears after weeks or months and is a recurrence of syphilis, not a direct effect of arsphenamine.

Indications. Suitable cases of syphilis, relapsing fever, yaws, and various other diseases. Arsphenamine is not dangerous when used wisely and with the best technic.

Contraindications are relative rather than absolute. The use of arsphenamine is particularly dangerous when the patient has:

1. Aneurism, coronary sclerosis, myocarditis, evidence of angina pectoris, or other severe lesions of the circulatory system.
2. In non-syphilitic nephritis.
3. In some cases of disease of the liver, pancreas, or adrenal glands.
4. Profound anemia, or pronounced cachexia not due to syphilis.
5. Severe pulmonary lesions, or marked physical weakness from any cause.

Caution is advisable when there are:

1. Syphilitic lesions of the central nervous system, or when their presence is indicated by changes in the spinal fluid or suggested by slight symptoms.
2. In the secondary stage of syphilis.
3. When the patient is alcoholic.
4. Shortly after fatigue or exertion.

5. When excess of any kind, work, or travel, cannot be prevented for a time after the injection.

6. In old age, or when there is advanced arteriosclerosis.

Administration. An infusion apparatus consisting of a glass receptacle with an *opening at the bottom*, a rubber tube provided with a glass window at the lower end, a clamp and a needle will suffice. At the Massachusetts General Hospital salt solution is used to establish the flow. When nearly all the salt solution has left the receptacle the arsphenamine is poured in. Salt solution is poured in again to clear the needle before it is withdrawn. Care is taken to prevent the entrance of air into the vein. About five minutes is allowed for the passage of the arsphenamine into the vein, and the rate of flow is regulated by the height of the receptacle.

This operation requires strict asepsis at every step.

Dose. Ordinarily, 0.1 to 0.6 gm. is used at intervals of from 5 to 10 days. In rare instances smaller or larger doses may be tried. The present tendency is toward small doses frequently repeated.

Caution. When danger is to be feared begin treatment with a series of very small doses at long intervals, or an energetic course of Mercury. The combined use of large doses of arsphenamine and of Mercury at the same time is believed to be unsafe.

Note.—Alternate courses of arsphenamine and of Mercury are to be recommended for syphilis.

NEOARSPHENAMINE.*

Action. Like that of arsphenamine but less powerful in equal dosage.

Toxic Effects. Similar to those of arsphenamine but milder with equal dosage.

Indications. It may be preferred to arsphenamine because easier to prepare, or when toxic effects are feared.

Contraindications. As for arsphenamine.

Administration. Use *immediately*, because contact with air causes rapid decomposition. Do not mix the drug until everything is prepared and the needle already in the vein.

Dose. 0.9 gm. of Neoarsphenamine contains nearly the same quantity of arsenic as 0.6 gm. Arsphenamine.

* Not official

Preparation of Alkaline Solution of Arsphenamine for Intravenous Use.

Printed instructions for preparing the solution are provided with the drug.

Technic of Mr. Godsoe at the Massachusetts General Hospital.

1. Everything used for preparing the solution is sterilized beforehand, and is handled under strictly aseptic precautions.
2. The drug is dissolved in the mixing bottle with 120 mils. of 0.6 per cent salt solution instead of distilled water. Solution takes place without the aid of beads.
3. To a dose of 0.6 gm. of arsphenamine thus dissolved 5 mils. of normal NaOH solution is added and the mixture is shaken until *perfectly clear*. The dispensing bottle is rinsed with the solution; the solution is filtered back into the dispensing bottle, and after insertion of the stopper, the neck of the bottle is covered with sterile gauze, which is held in place by a pin. The drug is then ready for use.

Arsphenamine may decompose within a few hours. It should be kept cool until needed, and should then be warmed only a little.

List of Articles Required for Preparing Solution.

1. Burette graduated to mils., containing normal NaOH solution.
2. Flask of 0.6% NaCl solution.
3. Glass funnel and filter paper.
4. One graduated and one plain 8-oz. bottle having glass stoppers.
5. Basin of antiseptic containing also the ampule of Arsphenamine, a file and a pin.
6. Sterile sheet and sponges.

2. HYDRARGYRUM. (U. S.)

“Mercury.”

Important preparations.

(a) *Hydrargyri salicylas* (U. S.). * “Mercuric salicylate.”

* A mixture of mercury 20.0 Lanolin (anhyd.) 30.0 chloretone 2.0 and olive oil to 100.0 is now being used at the Mass. Gen. Hospital.

(b) *Hydrargyri chloridum corrosivum* (U. S.). "Corrosive sublimate," "Bichloride of mercury."

(c) *Unguentum hydrargyri* † (U. S.). "Mercurial ointment."

(d) *Hydrargyri iodidum flavum* (U. S.). "Protiodide or yellow iodide of Mercury."

Action of the above preparations is essentially the same: antisiphilitic, local irritant, and antiseptic.

Elimination. Chiefly by intestines and kidneys; also in saliva. Excretion is slow.

Toxic Effects: *Acute Poisoning:* stomatitis, salivation, renal irritation, diarrhea, abdominal pain and gastric disturbance.

Chronic Poisoning: cachexia, anemia, etc.

Indications: Syphilis. The choice of a mercurial preparation depends on the stage and severity of the disease, the condition of the patient, and the circumstances under which the treatment is to be carried out. Each of the four preparations mentioned above has advantages lacking in the others.

Contraindications. Nephritis unless luetic, cachexia, anemia.

Administration and Dose.

(a) *Hydrargyri salicylas:* nearly insoluble; single dose 10 to 15 min. (or 0.6 to 1 mil.) of a 10 per cent emulsion of the drug in Petrolatum; repeat in from 5 to 10 days. Inject into the gluteal muscle. Use a platinum needle $1\frac{1}{2}$ in. long.

(b) *Hydrargyri chloridum corrosivum:* soluble; single dose 7 to 15 min. (or 0.5 to 1 mil.) of a 1 per cent solution of the drug in a 10 per cent watery solution of Sodium chloride; repeat in 1 or 2 days. Inject into the gluteal muscle. Use a platinum needle.

(c) *Unguentum hydrargyri:* administer by inunction. Dose $\frac{1}{2}$ to 1 drach. (or 2 to 4 gm.). Efficiency depends much on thoroughness of application.

(d) *Hydrargyri iodidum flavum;* administer in pills by mouth. Dose: $\frac{1}{6}$ gr. *t. i. d.* (or 0.013 gm.) and upward, increasing gradually until the first signs of intolerance appear. Then reduce dose by half and continue.

Caution. When mercurials are given, the mouth must be kept scrupulously clean to avoid stomatitis. Teeth should be brushed and throat gargled after every meal. If there is pyorrhea alveo-

† Conts. about 50% of Mercury by weight. Ung. Hydrarg. Dil. (U.S.), "Blue ointment," conts. about 33% of Mercury.

laris, the gums may be scrubbed with castile soap or swabbed daily with a 1 per cent solution of Potassium permanganate, applied with cotton stick; also rinse or spray mouth with Hydrogen peroxide. When giving the Protiodide of Mercury and Sodium or Potassium iodide also, give the Protiodide *a. c.* and the Potassium iodide *p.c.* to prevent formation of the Biniode of Mercury. When using large doses of any mercurial, the bowels should be kept clear, and the food should be readily digestible, nutritious and ample in quantity.

Note.—The reader is advised not to use Mercury in large doses or by injection unless familiar with the details of its administration, dosage and indications. Gottheil gives an excellent account in Forchheimer's "Therapeusis of Internal Diseases."

3. POTASSII IODIDUM. (U. S.)

"Iodide of Potash."

Properties. White, crystalline, very soluble in water.

Action. 1. Causes disappearance of gummatæ; but a lesion which disappears while iodides are being taken is not necessarily syphilitic.

2. Increases fluidity of mucus in respiratory tract.*

3. Seems to increase thyroid activity.

Elimination. Rapid, chiefly in urine as salts, partly in saliva.*

Toxic Effects: **Acute:** acne, erythema, and other serious skin lesions, catarrh of respiratory organs, gastric disturbances, delirium, etc. **Chronic:** loss of weight, nervousness, anemia.

Indications. 1. Late stages of syphilis.

2. Bronchitis with sticky expectoration.

3. Empirically in arteriosclerosis, asthma, lead poisoning, simple goitre, and many other conditions.

Contraindications. Acute renal irritation, acute inflammation of the respiratory tract, and "hyperthyroidism." It may be harmful in phthisis.

Administration. 1. For syphilis, 10 to 20 grs. (or 0.6 to 1.3 gm.) *t. i. d. p. c.* in milk. For syphilis of central nervous system, increase dose rapidly until benefit or iodism results. One hundred

* Bastedo.

grains (or 6.5 gm.) *t. i. d.* is large enough dosage. The sat. sol. in water is convenient: 1 min. = 1 gr. (or 1 mil. = 1 gm.).

2. As expectorant give 5 to 10 grs. (or 0.3 to 0.6 gm.) *t. i. d.*
p. c. well diluted.

3. For empirical action use small doses.

Substitutes. For syphilis. other preparations of Iodine, Mercury, or Arsphenanine.

As expectorant: Ammonium chloride.

4. SERUM ANTIDIPHTHERICUM. (U. S.)

Diphtheria Antitoxin. *

Action. Curative in diphtheria.

Absorption. It is absorbed slowly from the subcutaneous tissues, the process lasting for several days.

Toxic Effects. Urticaria, erythema, joint-pains, etc.

Indications. Clinical diphtheria; and for those exposed to diphtheria.

Contraindications. Never absolute. Dangerous in sufferers from horse asthma. It is doubtful whether a single dose of antitoxin ever produces sensitization in humans sufficient to cause anaphylactic shock on administering a second dose.

Administration. By injection into the loose subcutaneous tissues of the abdominal wall or below the angle of the scapula.

Intravenous injections are best for severe cases.

Dose. The dose should be gauged according to the severity of symptoms, duration of illness, and extent and location of the membrane. † Large doses are indicated when the larynx, trachea, or nasopharynx is involved, and especially in cases of virulent diphtheria.

Therapeutic dose for adults, 5000 to 100,000 units. For immunization, 1000 to 2000 units.

5. MORPHINÆ SULPHAS. (U. S.)

"Morphine" or "Morphia."

Properties. White, crystalline, soluble in about sixteen parts water; less soluble in alcohol.

* Manufactured by Departments of Health and by pharmaceutical firms. It can be obtained from the State Board of Health in Massachusetts free of charge.

† See Diphtheria, p. 133.

Action. 1. Diminishes sensibility to lasting impressions and stimuli. (Sollmann.)

2. Relieves pain.
3. Slows respiration and heart-action. (Bastedo.)
4. Diminishes metabolism.
5. Diminishes peristalsis; therefore, constipating.
6. In acute cardiac dilatation gives relief.
7. In colic or intestinal spasm it may act as a cathartic.

Elimination. Chiefly by gastro-intestinal tract. Some is oxidized in the body.

Toxic Effects. 1. Somnolence or stupor.

2. Respiration very slow and may become shallow and irregular (Cushny).

3. Pupillary contraction.
4. Flushing or cyanosis of face.
5. Retention of urine.
6. During recovery from drug nausea is common.
7. Death results from depression of respiratory center.

Indications. Acute conditions with:—

1. Severe pain.
2. Discomfort preventing sleep.
3. Acute cardiac insufficiency.
4. Internal hemorrhage (gastric, pulmonary, intestinal).
5. Persistent vomiting.

Contraindications.* 1. Danger of forming habit. In chronic or recurring non-fatal diseases, and in conditions which can be relieved by milder means, use morphine with caution if at all.

2. When bronchial secretion is profuse and viscid, morphine may prevent necessary expectoration: see pneumonia, p. 143.

It acts well in some cases of pulmonary edema, see hypertension, p. 33 and toxemic edema, p. 47.

3. Idiosyncrasy: causes excitement, vomiting, depression.
4. Relatively small doses should be used in infancy and for elderly persons. Morphine is seldom required and must be used with caution if at all when the respiration is much depressed by toxemia, e.g., in uremic conditions with Cheyne-Stokes respiration.

* Codman believes that morphine after abdominal operations may induce gastric dilatation; and Bastedo says it should not be used in "acute dilatation of the stomach or bowels."

Administration. For urgent conditions give subcutaneously in the dose of $\frac{1}{8}$ to $\frac{1}{2}$ gr. (or 0.008 to 0.032 gm.), with or without atropine sulphate, $\frac{1}{200}$ to $\frac{1}{120}$ gr. (or 0.00032 to 0.00052 gm.). Morphine is generally given by mouth in tablet, in watery solution, or in a mixture. Morphine can be absorbed from the mouth and will then act more quickly than if swallowed. Atropine given with morphine tends to diminish the gastric disturbance which may follow. Atropine produces toxic symptoms if repeated often in full doses.

Substitutes: Opium in pill, as tincture, or in suppository.

1. Pilulæ opii (U. S. VIII): conts. opium 1 gr. (or 0.065 gm.) equal to morphine $\frac{1}{8}$ gr. (or 0.008 gm.).

2. Tinctura opii deodorati (U. S.). Dose 5 to 15 m. (or 0.3 to 1 mil.).

3. Tinctura opii camphorata (U. S.) — "Paregoric." Dose for adult 1 to 4 dr. (or 4 to 16 mils.).

4. Codeinæ sulphas (U. S.) $\frac{1}{8}$ to $\frac{1}{2}$ gr. (or 0.008 to 0.032 gm.).

5. Diacetylmorphinae hydrochloridum (U. S.).

6. Scopolaminæ hydrobromidum (U. S.). Dose $1/150$ to $1/100$ gr. (or 0.00033 to 0.00065 gm.) subcutaneously. Combined with a small dose of morphine it may act better than either alone.

DIGITALIS. (U. S.)

Action in therapeutic doses is comparatively slight on the normal heart or when symptoms are not due primarily to cardiac insufficiency.

Absorption is variable and complete excretion is slow. Effects may persist for two weeks.

In well marked cases of cardiac insufficiency the following evidences of beneficial action of the drug should be looked for:

1. Slowing of the pulse rate.
2. Diminution of irregularity.
3. Increase in systolic blood-pressure when it has been subnormal or decrease when it has been excessive.
4. Diuresis if there has been cardiac dropsy.
5. Diminution of respiratory rate.
6. Relief from pain and distress symptomatic of cardiac insufficiency.

Toxic Effects. Tachycardia or bradycardia with irregularity, heart-block, pulsus alternans, fall of blood-pressure, oliguria, vomiting, headache. These effects may develop as a result of the cumulative action of digitalis if suitable initial dosage is continued for many days.

Indications. Myocardial insufficiency in general, with or without valvular disease. Almost useless in circulatory weakness resulting from vascular dilatation or from depletion.

Tachycardia, *per se*, does not call for digitalis.

Contraindications. When increase of blood-pressure would be dangerous, e.g., cerebral hemorrhage.

When heart-block is developing use digitalis cautiously if at all.

Selection of Preparation. The strength of digitalis varies so much that physiological standardization is essential and should be demanded. The "cat-unit" method of standardization has proved valuable. To attain the best results prescribe the same preparation from the most reliable available source. Either the tincture or the powdered leaves made up into soft pills are convenient and satisfactory when made from active leaves.

Administration. The dose of the tincture is from 5 to 30 min. *t. i. d.* (or 0.3 to 1.85 mils.) given in water; or from one to nine pills of 1 grain each (or 0.065 gm.) daily.

Higher initial dosage may be required in severe decompensation or when it is important to get the full effect of the drug promptly.

If after 48 hours neither beneficial nor toxic effects are observed, the dose should be increased.

When benefit begins to follow the use of the higher dosage, the dosage should be reduced to prevent the cumulative toxic effects. It is believed that free action of the bowels tends to prevent toxic effects.

Doses of the tincture should be measured in a graduated glass because, when prescribed in drops, the usual result is that the patient receives a dose much smaller than intended.

Through the work of Eggleston* and others, knowledge of digitalis therapy has gained much in precision and certain new

* Eggleston: Am. Jour. of the Med. Sc. Nov. 1920, p. 625. This is a very valuable article and gives references to other important works on digitalis. Luten: Jour. of A.M.A. Jan. 1, 1921.

concepts have been introduced. The most important of these is the use of massive initial doses with the object of obtaining effects more promptly. Eggleston describes his method as follows:

" From one to two days are required for digitalization. During the first twenty-four hours a dose of 4/10 gram (gr. vi or gr. vii) of the powdered leaf or 4 cc. (dram i) of the tincture should be administered every six hours, day and night for four doses. On the second day the dose should be reduced one-half and the interval may be shortened to four hours, giving four doses per day and none at night. This latter dose and interval should be continued until full digitalization is secured."

This method can only be used safely when the patient is under close observation and in the care of an experienced nurse. It has the advantage that benefit may be expected from the drug in from 12 to 24 hours.

As an emergency measure 20 to 30 min. (1.2-2 mils.) of the tincture may be injected intramuscularly. It is locally irritating.

Substitutes.

(1) "Digitan" † Dose 1 to 4 tablets in twenty-four hours. Each tablet contains 1½ grs. (0.097 gm.) of digitan and is about equal in strength to 15 min. (1 mil.) of the most active tincture of digitalis. The therapeutic effect is the same as that of other preparations of digitalis but effects may be expected in from 12 to 24 hours and vomiting rarely follows its use.

(2) Strophanthin (U. S.) is probably better than any existing preparation of digitalis for intravenous use. Its action on the heart when used in this way is like that of digitalis but effects are almost instantaneous. Solutions are liable to deterioration. Small repeated doses may be useful temporarily when digitalis cannot be taken by mouth. A full dose should be given only as an emergency measure and should not be repeated within 24 hours. Dose: 0.1 mg. to 0.5 mg. The drug should be injected very slowly over a period of not less than five minutes.

Contraindication. If digitalis in any form has been taken by the patient within ten days strophanthin cannot safely be used except in very small dosage.

† U. S. p. (N.N.R.) first introduced under the name of "digipuratum." It is expensive.

(3) Ouabain (N.N.R.) is a crystallized strophanthin, which can be obtained in ampules prepared by Hynson, Wescott and Dunning. One mil. of their solution contains 0.5 mg. but it should be noted that the ampules contain more than 1 mil. The date of manufacture and of expiration (3 months) is placed on each package.

This drug is best employed dissolved in from 4000 to 8000 parts of 0.85% sol. of sodium chloride. It can be given either intravenously or intramuscularly in the dose of 0.0005 gm. (gr. 1/120) which as a rule should not be repeated in less than 24 hours. The writer has had no personal experience with this drug.

7. NITROGLYCERIN.

Glyceryl trinitrate. ‡

Action. Lowers blood-pressure by dilating peripheral vessels. Acts within a few minutes; effect lasts about $\frac{1}{2}$ hour. In the presence of hypertension diuresis may result.

Toxic Effect. Flushing, sense of fulness in head, throbbing headache, faintness. Reduction of urinary output.

Indications. Angina pectoris.

Cardiac embarrassment
Headache } when due to high pressure.

Contraindications. Low blood-pressure.

Administration. Tablet triturate.* For quick absorption the tablet should be chewed and not swallowed.

Ordinary dose, $\frac{1}{100}$ gr. (or 0.00065 gm.) may be repeated frequently unless toxic symptoms result.

For some cases $\frac{1}{200}$ gr. (or 0.00032 gm.), or $\frac{1}{50}$ gr. (or 0.0013 gm.) is better. Larger doses may be required.

Substitutes. 1. Amylis nitris (U. S.). "Amyl nitrite."

Dose 3 to 5 min. (or 0.18 to 0.3 mils).

Acts very rapidly. Effect very transient.

May act when nitroglycerin fails.

Put up in "pearls" containing 3 or 5 min. (0.2 or 0.3 mils).

Break pearl and inhale from handkerchief.

‡ Official in the form of Spiritus Glycerylis Nitratis (U. S.).

* Tablets are said to lose strength but may remain good for years. To test them take $\frac{1}{2}$ tablet yourself.

Pearls † should break easily but not spontaneously.

2. Sodii nitris (U. S.). "Sodium nitrite."

Action like nitroglycerin, but lasts longer.

Best prescribed in watery solution.

Dose, 2 grs. (or 0.13 gm.).

8. THEOBROMINAE SODIO-SALICYLAS. (U. S.)

"Theobromine Sodium Salicylate."

Properties. White pwd. v. sol. in water, taste unpleasant, turns brown on exposure to air.

Action. Diuretic; slightly irritating to the kidneys. Effect is produced in from twelve to forty-eight hours; lasts for from two to three days.

Toxic Effect. Vomiting.

Indications. Cardiac dropsy. (Useless or nearly so in pure renal dropsy.) Small doses sometimes act well in angina pectoris, p. 51.

Contraindications. Acute nephritis.

Administration. In capsules or in a cachet *p. c.*

Dose, 15 grs. (or 1 gm.) 4 *i. d.* If no result after 48 hours, double dose. Never prescribe it in these doses for more than 3 days at a time.

Substitutes.

1. Theophylline (U. S.). Dose 3 to 6 grs. (or 0.2 to 0.4 gm.) *t. i. d.* in powder with water or in capsule.

2. If kidneys are sound, Calomel may be used in the dose of 3 grs. (or 0.2 gm.) every four hours for from twenty-four to forty-eight hours or even longer. To reduce danger of salivation take precautions described under Hydrargyrum.

9. MAGNESII SULPHAS. (U. S.)

"Salts," "Epsom Salts" or "Bitter Salts."

Properties. Colorless, crystalline, very soluble in water, taste bitter.

Action. Hydrogogue purge in concentrated solution, cathartic in dilute solution.

† Allen & Hanbury's are good.

Toxic Effects. Gastric irritation and vomiting. If given in concentrated solution it may be absorbed and may then cause severe poisoning characterized by oliguria, hematuria, slow respiration, paralysis of the intestines, extreme weakness and collapse.* The urine in poisoning shows a very high specific gravity owing to the excretion of the drug by the kidney. These effects are rare.

Indications. Dropsy or uremic states.

Contraindications. Weakness, emaciation, vomiting, menstruation, pregnancy.

Administration. Most easily taken in a cup of black coffee and most effective when taken 1 hour before breakfast or when the stomach is empty.

Dose. From $\frac{1}{2}$ to 1 oz. (or 15 to 30 gm.) followed by half a glass of water. Small doses with much water can be used for mild catharsis.

† **Substitutes.** 1. Croton oil, 1 to 3 min. (or 0.06 to 0.2 mil) in pellet of butter. If placed on the back of the tongue of an unconscious patient it will be swallowed.

2. Pot. bitartrate and Comp. jalap. pwd. $\overline{\text{aa}}$ drach. 1 (or 4 gm.).
3. Elaterium (Br. '98) $\frac{1}{4}$ gr. (or 0.016 gm.) in tablet. †
4. "Ten-ten," calomel and jalap. $\overline{\text{aa}}$ grs. 10 (or 0.65 gm.).

10. QUININÆ SULPHAS. (U. S.)

"Quinine."

Properties. White, cryst., slightly sol. in water, taste very bitter.

Action. Specific for malaria, antipyretic; readily absorbed, and rapidly eliminated in urine.

Toxic Effects. Tinnitus, headache, vomiting, erythema; occasionally renal irritation, amblyopia, or cardiac depression.

Indications. Malaria.

Contraindications. Idiosyncrasy. Patients are frequently mistaken in believing they cannot take quinine.

Administration. Ordinarily, 10 grains (0.65 gm.) *t. i. d.* is sufficient to cut short an attack of malaria in 48 hours. Larger

* Boos: Jr. A.M.A., Dec. 10, 1910.

† Elaterium has seemed to act better than Elaterin.

doses may be required and especially in the prenicious forms of malaria or in resistant cases. One of the more soluble salts of quinine should then be administered intramuscularly.

Quinine therapy should be preceded, as a rule, by moderate purgation. Calomel is especially recommended.

Treatment should begin as soon as the diagnosis is established. The sulphate is best given in capsule, but soft pills are generally satisfactory. Pills which are too hard may not be absorbed at all.

Within a few days after the fever has yielded to treatment the dose of quinine should be diminished. Then, in order to complete the cure and to prevent the patient from becoming a possible source of infection to others, he should continue to take quinine in the dose of 10 grains daily for three months. This dose should be taken 2-4 hours before the time of day at which the chills generally appeared during the most recent attack of fever.

Substitutes.

1. Quininæ hydrochloridum (U. S.): sol. in 18 parts of water.
2. Quininæ dihydrochloridum (U. S.): sol. in 0.6 part of water.

These preparations are well suited for intramuscular injection but this use of quinine should be limited to the pernicious forms of malaria, those resistant to ordinary treatment, and to cases in which vomiting prevents the use of quinine by mouth because local necrosis and pain generally occurs at the site of injection. Grall and Clarac say that local irritation can be avoided by using solutions not more concentrated than 1-20. The usual daily intramuscular dose of either of the above preparations is from 7 to 12 grains (0.455 gm. to 0.780 gm.) but Craig recommends for pernicious malaria injections of $7\frac{1}{2}$ grs. (0.4875 gm.) of "quinine bihydrochloride" repeated every four hours if necessary and Manson says that 30 grs. (2.0 gm.) may be given in enema.

II. SODII SALICYLAS. (U. S.)

Properties. A white powd. sol. in water, taste sweetish and saline.

Action. Analgesic, antipyretic, and diaphoretic. It has a *curative effect* in some forms of rheumatism (see rheumatic fever, p. 93). It increases nitrogen elimination in the urine and acts as

a cholagogue and diuretic. It is readily absorbed and is eliminated by the kidney.

Toxic Effects. Tinnitus, headache, vomiting, erythema, delirium and gastro-enteric disturbance. It is slightly irritating to the kidneys and unless given with alkali may cause albuminuria. Very large doses may cause drowsiness or coma.

Indications. Rheumatic fever and various forms of "rheumatism." Useless in the gonorrhreal and in some other types of arthritis.

Contraindication. Acute nephritis or idiosyncrasy.

Administration. In tablet or capsule followed by a *full glass of water* unless the heart be insufficient. If large doses are to be used prescribe also enough sodium bicarbonate to render the urine alkaline and see that the bowels be kept free.

Dose. For rheumatic fever, 10 grs. (or 0.65 gm.) of sodium salicylate every hour until the patient is relieved of pain; then 10 grs. (or 0.65 gm.) every 4 hours until convalescence has been established; then 20 to 30 grs. (or 1.3 to 2 gm.) daily for a month or more to prevent relapse. If toxic effects occur the medicine must be omitted until they pass off. It can then be resumed in smaller dosage or in different form. A vehicle, such as essence of pepsin, may be helpful. For mild cases of arthritis smaller doses may be sufficient. In chronic "rheumatism" 5 to 10 grs. (or 0.3 to 0.65 gm.) taken 2 to 4 *i. d.* may promote comfort.

Substitute. 1. Salicinum (U. S.). Action and uses like sodium salicylate but weaker and causes less gastric disturbance.

2. Methylis salicylas (U. S.). "Oil of wintergreen." Should be given in milk, or in capsule. Dose, 15 to 30 min. (or 1 to 2 mils).

3. Acetylsalicylic acid,* ("aspirin"). Dose as for sodium salicylate.

12. HEXAMETHYLENAMINA. (U. S.) †

Properties. Crystalline, readily sol. in water.

Excretion. Chiefly in the urine in the form of ammonia and formaldehyde or unchanged.

Action. When formaldehyde ‡ is set free it acts as a urinary

* Not official.

† "Urotropine," and "Formin," are proprietary names applied to Hexamethylenamina. (N. N. R.)

‡ May give Fehling's reaction. (Bastedo.)

antiseptic. When the drug is excreted unchanged, as often happens, it is inefficient. It acts only in an acid urine.

Toxic Effects. Renal irritation and hematuria, painful micturition and pain in the region of the bladder.

Indications. Especially useful in typhoid fever to prevent bacilluria and cystitis. It may act well in other cases of cystitis or pyelitis.

Contraindication. Acute nephritis.

Administration. In capsule or tablet. Dose 5 to 10 grs. (or 0.3 to 0.6 gm.) *t. i. d.* with a full glass of water. When the urine is alkaline or neutral, sodium acid phosphate * in the dose of 10 grs. (0.65 gm.) or more if needed can be prescribed to change its reaction, but this drug should not be administered *with* Hexamethylenamine because they are incompatible (Bastedo).

LIST II.

VALUABLE DRUGS

AND NON-MEDICINAL PREPARATIONS.

	PAGE
1. PILLS OF FERROUS CARBONATE, "BLAUD'S PILLS"	293
2. SULPHONETHYLMETHANE, "TRIONAL"	293
3. BROMIDES	293
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16. TUBERCULIN	301
17. NORMAL SALT SOLUTION	301
18. ALCOHOLIC BEVERAGES	301

* Not official.

SYNOPSIS OF LIST II.

I. Pilulæ ferri carbonatis. (U. S.) "Blaud's Pill."

Action: rubifacient, slightly constipating, turns stools black.

Used especially in chlorosis and secondary anemias.

Dose: pills of 5 grs. each (or 0.3 gm.); 1 to 2 *t. i. d.*, *p. c.*

Substit. 1. **Ferrum reductum.** (U. S.) Dose, 1 to 3 grs. (0.065 to 0.20 gm.) 3 or 4 *i. d.* in pill or powd.

2. **Liquor ferri et ammonii acetatis.** (U. S.) "Basham's mixture." Dose, 1 dr. (or 4 mils).

2. **Sulphonethylmethanum.** (U. S.) "Trional."

Action: hypnotic, sol. in 195 water, more soluble in alcohol.

Toxic Effect: somnolence and mental and physical depression.

Used for wakefulness, sometimes for alcoholic delirium.

Dose: for sleep, 5 to 15 grs. (0.3 to 1 gm.) in powd. by mouth.

Larger doses may be used for delirium.

Prescribed in powder by mouth with water or in sol. by rectum.

Substit. "Veronal." (U. S. *p.* and *t.*, N. N. R.) Dose, as for trional in powd. or tab.

3. (1) **Sodii bromidum.** (U. S.) "Sodium bromide."

(2) **Potassii bromidum.** (U. S.) "Potassium bromide."

Action: Mild sedative, lessens reflex excitability. Slightly irritating to the stomach.

Toxic Effect: Vomiting, acne, coryza, somnolence.

Used for nervousness, wakefulness, epilepsy, and to ward off alcoholic delirium.

Dose: Usually 5 to 15 grs. (or 0.3 to 1 gm.) *t. i. d.*, or a single dose at night for sleep.

Much larger doses may be required for epilepsy and for alcoholic patients.

Prescribed in watery solution by mouth well diluted and *p. c.*, or, occasionally, by rectum.

4. **Acetphenetidinum.** (U. S.) "Phenacetin." *

Action: analgesic, antipyretic, mild diaphoretic, and sedative.

Toxic Effect: circulatory depression.

Used especially for migraine and occasionally for other painful conditions.

Dose: 5 to 15 grs. (or 0.3 to 1 gm.) in tab. or powder. A small

* Bayer's is the best.

dose may be repeated in an hour or more if necessary. Prescribe with caffein citrate, 1 gr. (or 0.065 gm.).

5. Pulvis ipecacuanhæ et opii. (U. S.) "Dover's Powder."

Action: mild opiate: hypnotic, sedative, diaphoretic, antipyretic and analgesic; slightly constipating.

Toxic Effect: When stomach is irritable vomiting may result.

Used generally in single dose in the evening for malaise or insomnia in acute infections such as "grippe," tonsillitis, or the exanthemata.

Dose: 10 to 15 grs. (or 0.6 to 1 gm.) in pwd. by mouth.

6. Codeinæ sulphas.* (U. S.) "Codeine."

Action: mild opiate and sedative. Slightly constipating.

Toxic Effect: vomiting, generally on following day.

Used to allay unproductive cough.

Dose: $\frac{1}{2}$ to $\frac{1}{2}$ gr. (or 0.008 to 0.032 gm.) in tablet, by mouth.

7. Sodii bicarbonas.† (U. S.) "Soda." "Saleratus."

Action: antacid.

Toxic Effect: gastric disturbance, not poisonous.

Used for "hyper acidity," in acidosis, and in acid poisoning; to render urine alkaline; and with salicylate in acute rheumatism.

Dose: $\frac{1}{2}$ to 1 dr. (or 2 to 4 gm.) 3 to 4 *i. d.* with water by mouth. Larger doses may be required in acidosis.

8. Bismuthi subnitras. (U. S.) "Bismuth."

Action: mild astringent and antacid. Combines with H₂S in intestine to form a black, insoluble sulphide.

Toxic Effect: none with therapeutic dose.

Used for diarrhea, "hyper acidity," peptic ulcer, and for intestinal fermentation.

Dose: for diarrhea 10 to 20 grs. (or 0.65 to 1.3 gm.) repeated after each loose movement. For peptic ulcer $\frac{1}{2}$ doses of 1 dr. (or 4 gm.) are used *a. c.* to coat the ulcer and to relieve distress. Prescribed in powd. by mouth with water.

9. Hydrargyri chloridum mite. (U. S.) "Calomel."

Action: Mild purgative and supposed intestinal antiseptic. Diuretic. Antisyphilitic.

Toxic Effects: as for mercury (p. 267).

Use and Dose: (1.) as a mild purge, either in the dose of $\frac{1}{10}$ gr.

* Diacetylmorphine hydrochloride U. S. t. (N.N.R.) may be preferred.

† Magnesii oxidum (U. S.) is preferred by Dr. R. C. Cabot.

‡ Use a pure preparation: e. g., Squibb's.

(or 0.006 gm.) every 15 m. for 8 or 10 doses and followed by a mild saline cathartic 1 hour after the last dose, or 1 to 3 grs. (or 0.065 to 0.2 gm.) can be taken in single dose at night and the saline on the following morning.

(2.) As a diuretic: 3 grs. (or 0.2 gm.) every 4 hours for 24 to 48 hours or until diuresis begins. When using this dose the usual precautions against poisoning must be taken (p. 267). Prescribe in tablet.

(3.) Calomel is preferred by many to salicylate of mercury for the treatment of syphilis by injection.

10. Oleum ricini. (U. S.) "Castor oil."

Action: mild purgative; acts in 2 to 6 hours; after effect constipating. Do not prescribe it during menstruation or pregnancy.

Toxic Effect: not poisonous but may be vomited.

Dose: $\frac{1}{2}$ to 2 ozs. or more (15 to 60 mils.). Lemon juice or brandy helps to disguise the taste.

11. Fluidextractum Cascarae Sagradae. (U. S.) "Fl. ext. of cascara sagrada."

Action: mild laxative. **Taste:** very bitter.

Toxic Effect: irritation of bowel.

Dose: 10 to 30 m. (or 0.6 to 2 mils.) at bed-time with water.

12. "Russian Oil."

Petrolatum liquidum (U. S.) and "Russian Oil" are liquid paraffins under the definition of the British Pharmacopœia, but "Russian Oil" is not liquid petrolatum because of a difference between Russian and American Petroleum. "Russian Oil" is more refined than is ordinarily the case with liquid petrolatum. The latter usually has a yellowish color and an unpleasant taste, but the former is colorless and tasteless.

Substitutes for "Russian Oil" should have similar general characteristics, should be tasteless, and of high specific gravity. Lighter oils seem less efficient, and sometimes escape through the anus involuntarily.

Action: A lubricant which passes unabsorbed and undigested through the intestine. Unlike olive oil it is not a food, and is less apt to disturb the digestion.

Used chiefly in chronic constipation, alone or in conjunction with other forms of treatment.



Dose: 1 to 3 tablespoonfuls twice daily; preferably several hours after a meal.

13. Agar (U. S.).

Action: Agar swells tremendously by absorbing water, is not digested, and does not ferment in the intestinal tract. Therefore it stimulates peristalsis and helps to sweep out the bowel.

Used in chronic constipation, generally in conjunction with other forms of treatment.

Dose: $\frac{1}{2}$ to 1 tablespoonful once or twice daily.

Administration: Powdered agar can be eaten on cereal. Granulated agar can be mixed with and washed down with milk or water. Agar-agar wafers are more attractive but expensive.

14. Virus Vaccinicum (U. S.) Smallpox vaccine.

The living virus of cow-pox is used as a prophylactic against smallpox. The virus should be fresh, and a "take" or lesion of cow-pox is required to confer immunity.

Admin. 1. Clean skin with soap and water. Antiseptics, if used, must be washed off lest they kill the virus.

2. When dry, scarify skin very superficially without causing bleeding. A needle or any sharp instrument will serve.

3. Apply virus. After it has dried *completely* cover the spot with a sterile pad and secure it with adhesive plaster.

4. When the inoculation "has taken" the lesion should be bathed with antiseptics and dressed aseptically from time to time. Secondary infection and much pain can thus be avoided.

Note.—Virus is prepared by health departments nearly **everywhere** and is distributed free to physicians.

15. Typhoid vaccine.

A killed culture of typhoid bacilli standardized by count. Used for prophylactic inoculation against typhoid (p. 77).

In order to guard also against paratyphoid A and B, a mixed vaccine is advised.

In general, three doses are given subcut. at intervals of a week or ten days as follows: 500 million, 1,000 million, and 1,000 million.

The reaction is seldom severe. There may be fever and malaise.

The interval between injections should not be longer than 10 days lest anaphylaxis result.

Inoculation is strongly recommended for persons who travel, for nurses, physicians, soldiers and others who may be exposed to typhoid infection.

Note.—Prepared by health departments * and pharmaceutical firms.

16. *Tuberculin.*

Used for diagnostic tests and for treatment in suitable cases of tuberculosis. For detailed information see "Early Pulmonary Tuberculosis: Diagnosis, Prognosis, and Treatment," by John B. Hawes, 2d, M.D. (Wm. Wood & Co.)

There are several kinds of tuberculin. Koch's old tuberculin is a glycerine extract of tubercle bacilli. It is still used extensively.

17. *Liquor Sodii Chloridi Physiologicus* (U. S.) "Normal salt solution."

Used by hypodermoclysis, intravenously, or by rectum, depending upon circumstances and object in view.

The common solution consists of .85 per cent of sodium chloride in distilled water.

Solutions are prepared also according to other formulæ which contain calcium and potassium chloride in addition to sodium chloride.

When prescribing specify formula desired.

18. *Alcoholic beverages.*

A. (a) *Spiritus frumenti* (U. S. VIII). "Whiskey."

(b) *Spiritus vini Gallici* (U. S. VIII). "Brandy."

Uses:

(1.) "Quickly diffusible stimulant": dose by mouth, 1 drach. to 1 oz. (or 4 to 30 mils). Dose subcut. 30 min. (or 2 mils).

(2.) To promote appetite; best taken with meals and well diluted.

(3.) As a food in malnutrition when other foods are not absorbed in sufficient quantity. Alcohol is especially useful in selected cases of typhoid or septic infection.

Dose 1 to 2 oz. (or 30 to 60 mils) diluted with water and repeated at intervals of 2 to 6 hours. Larger doses are sometimes beneficial.

If odor remains long on breath reduce dose or lengthen interval.

Champagne is often borne better than whiskey or brandy when the stomach is irritable.

* Distributed free in Massachusetts by the State Board of Health.

(4.) Whiskey well diluted with water or wine taken with meals is beneficial for some elderly persons who are not over-fat.

B. Beer, ale, porter, or malt may be prescribed with meals to improve appetite and to promote increase of weight.

LIST III.

DRUGS COMMONLY USEFUL.

1. FERRUM REDUCTUM. (U. S.)
2. LIQUOR FERRI ET AMMONII ACETATIS. (U. S.) "Basham's mixture."
3. DIACETYLMORPHINAE HYDROCHLORIDUM. (U. S.)
4. SPIRITUS AMMONIÆ AROMATICUS. (U. S.)
5. POTASSII BITARTRAS. (U. S.) "Cream of tartar."
6. POTASSII CITRAS. (U. S.)
7. PILULA SCILLÆ COMPOSITA. (Br. '14.)
8. LIQUOR ANTISEPTICUS ALKALINUS. (N. F.) "Alkaline antiseptic solution."
9. LIQUOR SODII BORATIS COMPOSITUS. (N. F.) "Dobell's solution."
10. CAFFEINA CITRATA. (U. S.)
11. STRYCHNINÆ SULPHAS. (U. S.)
12. TINCTURA NUCIS VOMICÆ. (U. S.)
13. SYRUPUS HYPOPHOSPHITUM. (U. S.) "Syrup of hypophosphites."
14. SYRUPUS HYPOPHOSPHITUM COMPOSitus. (U. S. VIII.) "Compound syrup of hypophosphites."
15. PHILLIPS' MILK OF MAGNESIA.†
16. SENNA. (U. S.) "Senna leaves."
17. GLYCERINUM. (U. S.)
18. TINCTURA IODI. (U. S.)
19. TINCTURA BELLADONNÆ FOLIORUM. (U. S.)
20. PILULÆ CATHARTICÆ COMPOSITÆ. (U. S.) "Compound Cathartic Pills."
21. PILULÆ ALOINI, STRYCHNINÆ, ET BELLADONNÆ (N. F.) "A. S. and B. Pills."

† Proprietary.

LIST IV.

DRUGS VALUABLE FOR OCCASIONAL USE.

1. THYROID EXTRACT.*
2. LIQUOR POTASSII ARSENITIS. (U. S.) "Fowler's solution."
3. PILOCARPINÆ HYDROCHLORIDUM. (U. S.)
4. APOMORPHINÆ HYDROCHLORIDUM. (U. S.)
5. VINUM COLCHICI SEMINIS.† (U. S. VIII.)
6. QUININÆ HYDROBROMIDUM. (U. S.)
7. SCOPOLAMINÆ HYDROBROMIDUM. (U. S.)
8. CAFFEINÆ SODIO-BENZOAS. (U. S.)
9. OLEUM TIGLII. (U. S.) "Croton Oil."
10. ELATERIUM. (Br. '98.)
11. ADRENALIN CHLORIDE SOLUTION, ‡ 1 to 1,000.
12. COCAINÆ HYDROCHLORIDUM. (U. S.)
13. ATROPINÆ SULPHAS. (U. S.)
14. THEOPHYLLINA. (U. S.)
15. EMETINÆ HYDROCHLORIDUM. (U. S.)

WEIGHTS AND MEASURES.

METRIC WEIGHT.

1 kilogram ** (kg.) equals in weight 1 litre of distilled water at maximum density, *i.e.*, at 4° C. and 760 mm. pressure.

1 kg.	= 1000 grams.
1.0 gm.	= gram. (gm.).
0.1 gm.	= decigram (dg.).
0.01 gm.	= centigram (cg.).
0.001 gm.	= milligram (mg.).

METRIC FLUID MEASURE.

1 L.	= 1 Liter of 1000 milliliters or cubic centimeters
1.0 cc.	= 1 mil.
0.1 cc.	= 0.1 mil.

* Not official. Burroughs Welcome & Co.'s extract is good.

† This preparation is much weaker than the wine of the root or than the tincture. The dose, therefore, is larger.

‡ U. S. t. Parke, Davis & Co.

** One avoird. pound = 0.453592 Kg.

One kilogram = 2.20462 pounds.

RELATIVE TABLE.

Metric	Apothecary	Weight
1 gm.	= 15.5 grains	
0.1 gm.	= 1.55 grains	
0.01 gm.	= .155 grains	
0.001 gm.	= .0155 grains	

Metric	Apothecary	Measure.
1 L.	= 2.1133 pints (approx. 2 pints)	
1.0 mil.	= 16.2306 min. (approx. 15 min.)	
0.1 mil.	= 1.623 minims	

APOTHECARIES' OR TROY WEIGHT.

lb. I = 1 pound of 12 ounces.
 ʒI = 1 ounce of 8 drachms.
 ʒI = 1 drachm of 60 grains.
 gr. I = 1 grain (or 0.065 gm.).

Note.—The Imperial Standard Troy weight corresponds with Apothecaries' weight in pounds, ounces, and grains but it divides the ounce into 20 pennyweights of 24 grains each. (U. S. D.)

U. S. APOTHECARIES' OR WINE MEASURE.

O I = 1 pint of 16 fluid ounces.
 Fl I = 1 fluid ounce of 8 fluid drachms, (weight = 455.6 grs.).

Fl. ʒI = 1 fluidrachm of 60 minims.
 Min. I = 1 minim.

Note.—The "Imperial Measure" used in the British Pharmacopœa differs in some respects from the above. One Imperial pint is divided into 20 fluid ounces, each equal to 7 fluidrachms and 41 minims of U. S. Apothecaries' Measure.

RELATIVE TABLE.

Weights.

<i>Apoth.</i>	<i>Metric.</i>
1 oz.	= 31.10 gm. (approx. 30 gm.)
1 drachm.	= 3.88 gm. (roughly 4 gm.)
30 grs.	= 1.94 gm.
15 grs.	= 0.972 gm. (approx. 1 gm.).
10 grs.	= 0.648 gm.
5 grs.	= 0.324 gm.
1 gr.	= 0.065 gm.
1/4 gr.	= 0.01620 gm.
1/6 gr.	= 0.01080 gm. (approx. 10 mgm.).
1/8 gr.	= 0.00810 gm.
1/30 gr.	= 0.00220 gm.
1/60 gr.	= 0.00110 gm. (approx. 1 mgm.).
1/100 gr.	= 0.00065 gm.

Measures.

<i>Apoth.</i>	<i>Metric</i>
1 pint	= 473.11 mils.
1 Fl. oz.	= 30.00 mils.
4 Fl. drach.	= 15.00 mils.
1 Fl. drach.	= 3.70 mils. (roughly, 4 mils).
30 min.	= 1.85 mils.
20 min.	= 1.23 mils.
15 min.	= 0.92 mils. (roughly 1 mil).
10 min.	= 0.61 mils.
5 min.	= 0.305 mils.
1 min.	= 0.06 mils.

ABBREVIATIONS.

U. S.	United States Pharmacopœia, 9th Rev.
Br.	British Pharmacopœia
N. F.	National Formulary, 4th Ed.
U. S. p. and t.	United States patent and trademark.
N. N. R.	New and Nonofficial Remedies, 1921.
U. S. D.	United States Dispensatory, 20th Ed.

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